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THE GREAT LAKE COUNTRY.

Niagara. — The American Side.

Harnessing Niagara.

If you imagine a line of very strong horses, harnessed tandem, extending eight hundred and fifty miles, from Boston almost to Chicago, all pulling steadily, you will get some idea of the amount of power which it is expected will be taken from Niagara Falls by water-wheels, and distributed chiefly in the form of electricity.

Between three and four million dollars have been spent in digging the tunnel and wheel-pit from which the first instalment of the power is supplied, and much more money will be used to develop the full four hundred and fifty thousand horse-power for which the plans provide.

No one can tell at present just how far this enormous force will be sent; but some of the best engineers believe that it will be made to turn mill-wheels, light streets and even light and heat houses throughout the greater part of New York State, a large territory in Canada, and perhaps here and there in neighboring states.

Yet the great cataract will not be robbed of much of its strength; for it is estimated that the horse-power of Niagara Falls is nearly five million, nine hundred thousand —the greatest that nature has concentrated at any one place on the globe except, possibly, the yet unmeasured Victoria Falls of the Zambesi. It has been said that all the coal mined in the world would barely supply the steam-pumps which would be needed to pump back the water that flows over the Falls.

When the water required to create four hundred and fifty thousand horse-power is drawn from the river above the Falls and sent to the gorge below by a short cut through tunnels, the great cataract will be lowered about seven inches only, and the loss will hardly be noticed.

Plans for using Niagara Falls to run machinery had been considered for half a century, but it was not until 1886 that the necessary permission to use Niagara water was asked and obtained from the New York Legislature. Four years later money for the undertaking had been supplied by capitalists and banking houses.

An International Niagara Commission, under the presidency of Sir William Thomson, of England, now Lord Kelvin, was formed to invite the leading engineers of Europe and America to submit plans for harnessing the cataract without marring its beauty.

Making the Canal.

Twenty-six plans were submitted, and from these the company's engineers devised the designs finally adopted.

On October 4, 1890, the first spadeful of earth was dug, and from that time the work was hurried with all possible speed. Told in the simplest way, the undertaking consists of a number of deep holes in the ground, one much larger than the rest, each with water-wheels at the bottom. The water from the Niagara River is carried to these pits by a canal, led down to the wheels in pipes and then off to the lower river through a tunnel which connects all the pits.

All who have visited Niagara will remember that the river turns almost at a right angle at the Falls. The tunnel, stretching from a point near the river a mile and a half up-stream from the American Fall to a point about one thousand feet below the American Fall, forms, roughly, the hypothenuse of a right-angled triangle, the Falls being at the right angle.

The canal through which water from Niagara flows to the tunnel leads in from the river about two thousand feet. Along the sides are a score of inlets controlled by massive gates. Ten inlets open through the thick masonry which lines the main wheel-pit, and each leads into a steel pipe called a penstock, about as large around as an ordinary street-car.

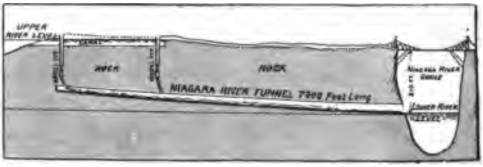
The penstocks run straight down one hundred and forty feet and discharge into a turbine, consisting of a pair of water-wheels, whose shaft extends upward beside the penstock into the power-house built directly over the pit.

When one of the gates is raised by a delicate electrical apparatus which controls it, water from the canal pours in and flows down the penstock, or water-pipe, pressing into the turbine with a force of five thousand horse-power. After passing through the wheels the water travels on from a discharge tunnel at the end of the wheel-pit out into the main tunnel.

The largest pit, which was completed on the first day of January, 1894, is one hundred and seventy-eight feet deep, twenty-one feet wide, and one hundred and forty feet long. At present there is room for only four penstocks.

It is not easy to imagine a hole pulled up out of the ground, but the masonry that lines this wheel-pit is so thick and strong that if the pit could be pulled up, its walls probably would stand firm like a giant chimney. The chief interest lies in this main wheel-pit, for it is here that electricity is to be generated for distribution throughout the neighboring country.

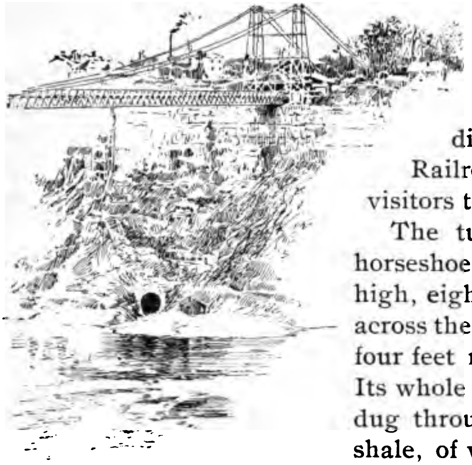
The smaller pits are to supply water-power direct to the various mills that will cluster around the inlet canal. The turbines at the bottom of one of these smaller pits are now turning the wheels of the largest paper-mill in the world.



Profile of the Tunnel.

The tunnel itself simply carries off the water that has done its appointed work. Yet its construction has been the most difficult part of the whole undertaking, keeping many hundred men busy more than two years, costing in round numbers a million and a quarter dollars; and worse yet, costing twenty-seven lives, through various accidents.

The tunnel slopes gently down from the bottom of the wheel-pit to the portal, just beyond the new suspension bridge, a mile and a third distant, passing beneath the busiest part of the city of Niagara Falls and almost directly under the Central Railroad Station, where most visitors to the Falls alight.



The Outlet.

The tunnel is shaped like a horseshoe; it is twenty-one feet high, eighteen feet and ten inches across the broadest part and nearly four feet narrower at the bottom. Its whole length was blasted and dug through limestone rock and shale, of which enough was taken out to make twenty acres of valuable real estate, when dumped along the shore of the river. This rocky river-bed, two hundred feet underground, is lined with from four to six rings of brick especially prepared to resist wear and tear by the water.

The outlet from which the water flows into the river looks from above like a commonplace black hole down by the water's edge. Yet it is said to be one of the most solid pieces of masonry ever built. It rests on a ledge of sandstone forty feet below the level of the river, and is built up as strongly as steel and stone and cement can make it.

It is well that it should be strong, for it must withstand for many years to come the action of the current without, which boils and foams as it swirls down from the rocks below the

Falls, as well as the tearing rush of the waters within, which pour down a steep incline at the end of the tunnel.

The shaft from each turbine down in the main wheel-pit extends up through the floor of the power-house, to connect with the revolving part of a dynamo capable of converting five thousand horse-power into electricity, which can be sent easily over wires for many miles in any direction, and at the end of its journey can be changed back into the original form of power.

The process is a good deal like sending money by mail. Silver dollars could not be carried easily in a letter, but they may be exchanged for a money-order which, at the end of its journey, can be changed back into silver dollars.

Each dynamo has its own water-gate, water-pipe, water-wheel and shaft, forming practically separate and independent power-plants good for five thousand horse-power each. For a short distance, at least, the electric current is to be sent out on underground wires carried in a subway big enough to walk through without stooping.

Electrical Subway showing brackets on which the wires will be carried

When it is sent to greater distances, however, it probably will be carried on poles, like the trolley wires for electric street-cars.

As the use of electricity could not be very great at first, the wheel-pit was completed to turn four turbines capable of producing twenty thousand horse-power. As more power is needed the extension of the wheel-pit will make room for six more turbines, until fifty thousand horse-power can be generated there, and the tunnel is filled to half its capacity. The other half is needed for the smaller water-power pits that will empty into it.

The company has secured the right to dig another tunnel of the same size as the present one, and with wheel-pits to match.

Beside this, practically the same company has bought permission from the Canadian government to dig two wheel-pits and tunnels on the Canada side, solely for the generation of electricity. The plan is to build the first of these wheel-pits and the power-house to match close to the brink of the Horseshoe Fall, at the foot of the high bank directly underneath the Falls View Station. The tunnel will slope down from the bottom of the pit four hundred feet to the river below the fall.

Each of the Canadian tunnels is to carry away the water needed to generate one hundred and twenty-five thousand horse-power. The total capacity of the plants to be built on both sides of the river will be, therefore, four hundred and fifty thousand horse-power.

The chief uncertainty about electricity is that it seems to leak from the wires. The longer the journey it makes the more of it is lost by the way, and consequently the more it will cost. The expense of sending it by wire or subway is also heavy. A great deal depends on this question of price. How far can electricity be sent without a loss that will make its cost equal to steam-power? Upon that question depends whether Niagara's power shall be used only near by the great cataract, or whether it shall be sent broadcast. Inventions have been made recently which, it is believed, will make it possible to carry electricity a great distance without a loss large enough to make its cost equal that of coal.

Nikola Tesla, the brilliant young electrician who astonished scientists by proving that an electrical current can be created which will pass through the upper air without wires to conduct it, says, "The current from Niagara Falls can be taken as far as New York city without great loss, and I believe that before long we shall be able to take it any distance."

CURTIS BROWN.

The St. Clair Tunnel.

No other profession is so much like war as civil engineering. The chief engineer, like the general, must make his plans with the greatest patience and care. He must know the exact facts and guess at nothing. When he cannot avoid guessing, he must weigh all the chances with careful judgment; and when he has done his best he may meet sudden and unlooked-for emergencies, in which all his care will not save his work from ruin.

Of all engineering work that which is least certain is driving tunnels under rivers or other bodies of water. Usually the tunnel must be driven in clay or river silt or sand and gravel, with more or less loose rock and boulders. The trouble is to keep a tight roof, and, if the material is very soft, to keep the tunnel itself in shape.

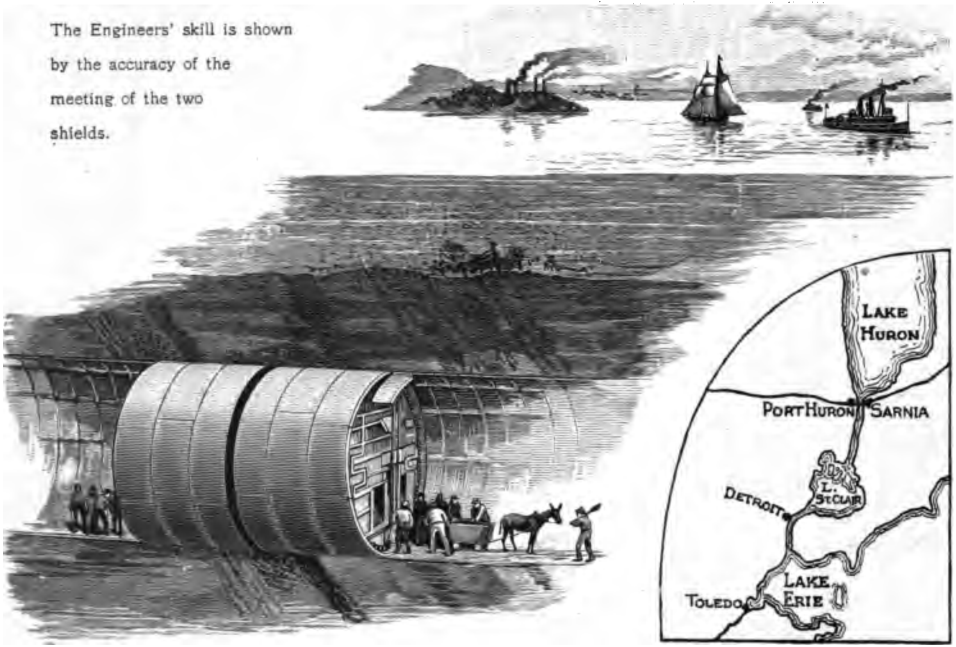
The St. Clair Tunnel is one of the most remarkable in the world. The tunnel is six thousand feet long, about a mile and one-seventh. Including the open cuttings on each end, the excavation extends eleven thousand six hundred feet, about two miles and one-fifth.

The tunnel was driven through blue clay. Above flows a swift river, forty feet deep. Between the tunnel and the water are from fifteen to twenty feet of clay, sand and gravel.

The novelty and magnitude of this work, the difficulties met, and the boldness and speed with which it was done, have made it a matter of great interest to engineers all over the world.

The Grand Trunk Railway crosses the St. Clair River from Sarnia, Ontario, to Port Huron, Michigan. On the St. Clair River there is a shipping commerce five times as great as that which passes through the Suez Canal.

The river is from half to three-quarters of a mile wide, and the current flows at from six to eight miles an hour.



The Engineers' skill is shown by the accuracy of the meeting of the two shields.

The Hydraulic Shield.

For many years trains were taken across on great ferry-boats. This was comfortable enough for passengers, but it wasted precious time; the boats were expensive to keep up and to operate, and in winter, when the river is full of floating ice, the delays and cost were serious.

To carry the tunnel through clay, with occasional pockets of gravel and quicksand and with a great river flowing only fifteen feet overhead, and to protect the workmen from accidents, was a difficult problem.

It was decided to do the work inside of steel tubes, called shields, which should be pushed ahead as the work advanced, and to line the tunnel with rings of cast iron close behind the shields when they were driven forward. In this way the danger of collapse of the tunnel would be avoided, and it would be practically finished as fast as it was dug.

One shield was started in from the Michigan side and one from the Canadian side. Each of them was a tube twenty-one feet and six inches in diameter, and fifteen feet three inches long. It was made of steel plates one inch thick. The plates at the forward end of the tube were sharpened to a cutting edge all around the circumference.

This tube was stiffened by steel plates put in up and down and crosswise, dividing the inside into square cells. Five feet from the back end of the tube was a partition, also of steel plates, in which were two square doors near the bottom. The men worked in the front part of the tube, cutting down the clay and throwing it back through the doors. Then it was loaded into small cars and hauled away to the rear on a narrow railroad track, by mules or horses. There was a second track to bring in the empty cars.

As fast as the shield went forward the tunnel was lined with rings of cast iron. Each of these rings was twenty-one feet in diameter and eighteen inches long, measured in the direction of the length of the tunnel. The ring, being of less diameter than the shield, could enter the rear of it; and so there was always a complete tube of steel and iron from the face of the clay where the men were digging to the entrance of the tunnel.

Each iron ring is made of thirteen pieces of cast iron, each piece weighing about half a ton. The pieces are bolted together, and each completed ring is bolted to the one behind it so that the tunnel is lined with a continuous tube of iron two inches thick and water-tight. The cast-iron lining weighs about twenty-seven thousand tons. The shields were pushed forward by hydraulic jacks. The hydraulic jack is a cylinder into which water is forced; and the water, entering, pushes a piston just as the steam in a locomotive cylinder pushes the piston to one end or the other of that cylinder.

The hydraulic jack can be made to give power. Each shield had twenty-four of these jacks in the rear end, placed in a circle close to the shell, or outside plates of the tube, and also so placed that when their pistons were thrust out they would push against the cast-iron ring forming the lining of the tunnel.

They could push with a force of three thousand tons — a power sufficient to lift up bodily a large ocean steamship. This tremendous power was found to be twice as much as was needed to force the shield forward into the clay.

At each step the shield was pushed along eighteen or twenty inches. Then a new ring was added to the tunnel lining; the clay was cut down as far as it could be done safely, and carried away. Then the shield was pushed forward another step.

This was all very simple so long as the work was under the dry land; but when it reached out under the river it was necessary to find some way to keep the water out. Otherwise, when seams of loose material were struck, water would have poured in and flooded the tunnel, and stopped the work entirely. To prevent this, compressed air was used.

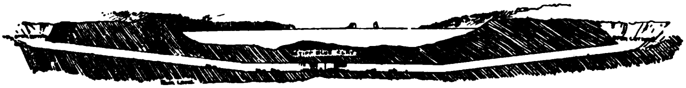
Every one knows that he can hold up a column of water with a column of air. Let him fill a U-shaped glass tube half full of water, hold it upright, with the open ends upward, and blow into one end of it.

The water will rise in the other leg of the tube, and the harder he blows the higher the water will rise and the longer will be the part of the tube free from water.

Now, if one could put a fly in the dry leg of the tube and stop the end of it, the water would be held in the other leg, and the fly could move about at his pleasure, dry-shod.

This is the principle on which compressed air has long been used in deep foundations and other work under water. At the St. Clair Tunnel the dry leg of the tube was the tunnel; the wet leg was the river, and the workmen were the flies.

It must be remembered that in all of this description I speak of one-half of the tunnel. It was built from the United States side and from the Canadian side, simultaneously, and the work at each end was entirely independent of that at the other, until the headings met under the middle of the river.



Profile of the Tunnel.

A brick partition, eight feet thick, was built in the tunnel just where it passed below the edge of the river. This was to hold the air in the tunnel. The air was pumped in through tubes built in the brick partition, and the pressure was always kept up to the point where it balanced the weight of the water overhead.

It will be understood that the deeper one goes, and the higher the column of water, the greater the air pressure that must be carried.

The men, mules and clay cars went in and out of that part of the tunnel which was filled with compressed air by means of an air-lock in the brick partition. This was a big tube extending through the partition with a door at each end, both doors opening against the air pressure — that is, toward the working end of the tunnel.

To get into the tunnel from without, the air in the lock was allowed to escape until the outer door could be opened. Then one entered the air-lock, shut the door and opened a valve by which compressed air from the tunnel ahead was let into the lock. When the pressure there was equal to that in the tunnel ahead, the inner door could be opened and one could pass into the tunnel. To get out the process was reversed.

The painful part of the journey is in the air-lock, at the time when the pressure is changing. There people often suffer severe pain in the ears from unequal pressure on the two sides of the ear-drum, and sometimes the suffering is so great that they cannot go on.

After one has been a little while in the compressed air the pain ceases; but there is a trouble which is peculiar to working in compressed air, and which disables a good many men. The men call it the bends. It is a paralysis, more or less complete, of the muscles, and especially of the muscles of the legs.

Sometimes it is not painful, but often it is very painful indeed. At the St. Clair Tunnel horses could not work in the compressed air, but mules stood it well, though occasionally one of them was visited with the bends.

The pressure of air carried was ten pounds per square inch at first, and twenty-three pounds when the middle of the river was reached. At times it was run up to forty pounds. Of course these pressures are in addition to the normal atmospheric pressure of fourteen pounds per square inch, which is always present on every body and every surface in the open air.

The air pressure was kept up by pumps, and to guard against accident there were two sets of air-compressors at each end of the tunnel. If the supply of air had failed for a moment the water would have rushed in and drowned the men.

Besides the air-compressing plant, machinery had to be provided for pumping out any water that drained into the tunnel during the work, and other machinery for lighting it by electricity. There were hoisting engines and derricks with which to lift to the surface the dump cars as they came out loaded with clay.

It happened repeatedly that the shields, as they were forced forward, entered pockets of gravel or quicksand going deep down into the blue clay. Then the air would escape through the loose material, and the water would begin to flow in.

Generally this could be stopped soon by increasing the quantity of air pumped in, but not always. Sometimes the air blew out through the bottom of the river so fast that the air-pumps could not keep up pressure enough to stop the flow of water.

More than once it seemed as if the tunnel would be flooded in spite of all that could be done, but luckily the engineers were always able, by plastering over the face of the gravel with clay, and by working the air-compressors up to a pressure of as much as forty pounds to the square inch, to hold back the water long enough to get the shield through the loose gravel into the clay beyond.

On the thirtieth day of August, 1890, the shield from the United States shore met that from Canada, under the middle of the river. This was just one year after they started on their strange journeys; and I do not believe that any one was happier or more thankful than was the chief engineer of the St. Clair Tunnel on that August day.

H. G. Prout.

Winter-Fishing on Saginaw Bay.

Most boys and a few girls know something about fishing for trout, pickerel or bass in the brooks, ponds and rivers, and many, no doubt, have fished in the sea for cod and mackerel.

Fishing, in fact, is a popular recreation in nearly all countries. For this reason it may be interesting to many readers to hear something of a method of fishing, less well known than the tactics of the hook and line, such as is practised through the ice of the Great Lakes of our country in winter.

But first let me ask our younger readers to fetch the atlas, or geography, and turn to the map of the State of Michigan, and find Saginaw Bay, an indentation in the northeastern shore of lower Michigan, about seventy miles in depth and sixty miles in width at its junction with Lake Huron.

The shores of this great Bay curve gradually toward each other, until they reach the famous Saginaw River, from which the Bay derives its name.

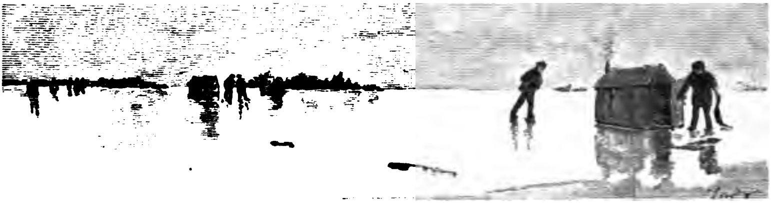
About forty miles down the Bay the Charity Islands stretch across its centre, and, to some extent, protect it against the wild northeast storms of that region.

In mild winters there is always open water above the Charity Islands, and the ice, from five to ten inches thick, is often more or less broken up, and dangerous for fishermen; but in cold winters the Bay will be solidly frozen out to the islands, and sometimes far beyond them. I have been on it, ice-boating, when there was no obstacle in the way of a sixty-mile run, with much of the ice-field as smooth as glass, over which our boat would fairly fly in a wild race with the wind.

On this huge winter park there have been known to be, at one time, as many as two thousand five hundred people engaged in fishing. It might be deemed a risky place on which to live, and yet, with the ice thirty-six inches thick, without a bubble, there is not the slightest danger until the warm days of spring.

The fisherman's house is unlike anything else ever made for people to live in, and you would say, if you were a stranger in an ice village, that the huts must have been built for dogs, for they are just about like dog-kennels, only they are not nearly so well made as most such kennels.

The shanty, for that is the name by which the winter house is known, is from five to six feet long, by about two and a half to three feet wide, three and a half feet high at the eaves, with a sharp pitch roof; so that directly under the ridge a man of ordinary height can stand with head and shoulders a little bent.



Fishing Shanties.

This pigmy structure is made of rough boards, and covered all over with tarred paper. The floor is of loose boards, laid on the ice. The furniture consists of a narrow wooden bench, extending along one side, which serves as a seat by day and a couch by night.

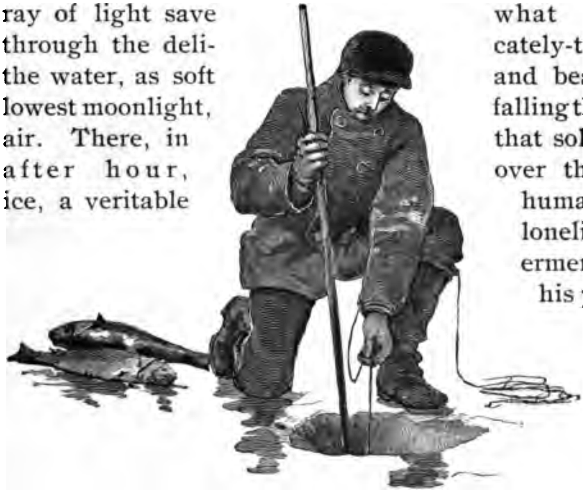
Wedged in at the rear end is a little sheet-iron stove, scarcely larger than a big frying-pan, on which stands a small spider and a coffee-pot. At the front end is a door, so small that the fisherman has to bend on entering the house.

Just inside the door is the fishing-hole, about eighteen inches square, in which the water rises almost to the surface, and from which every speck of ice has been carefully removed.

Above this hole in the ice is a small hole in the roof, through which the spear-handle is passed when removing it from the water, but which is kept tightly closed when the fisherman is at work. The spear-head has six barbed prongs of fine steel. The handle is about seven feet long, and is secured by a strong cord to the roof. On one side of the handle a screw, about three feet from the spear-head, serves as a rest, and holds the spear perpendicularly in the hole.

The spear is thus supported by the screw, which is caught on the edge of a floor board. In that position it is at the right hand of the fisherman, ready for instant use.

Having seen the shanty, let us now follow the fisherman into it and observe him at his vocation. Getting inside, he closes the door carefully, thus shutting out every ray of light save what is sifted up through the delicately-tinted green of the water, as soft and beautiful as mellowest moonlight, falling through summer air. There, in that solitary cell, hour after hour, over that hole in the ice, a veritable human cat, sits the loneliest of lone fishermen, waiting for his prey. In his left hand he holds a slender cord, to the lower end of which is attached a decoy. The decoy is a herring, when it can be obtained. When the fisherman cannot get a herring, he uses an imitation one, made of wood ballasted with lead and trimmed with tin fins and tail and glass eyes; and this herring-decoy is a beautiful imitation, as seen twenty feet below in the water, with every scale shining as white as a new silver coin.



Fishing through the Ice.

The fishing is done in water the depth of which varies with the run of the fish, which is at times well inshore and again off, in thirty, fifty and seventy feet of water. The decoy-line is knotted at a point that will bring the pursuing fish up to within eighteen inches of the spear; so that when that knot reaches the fisherman's hand he knows just about the distance he has to drive his spear.

When the fisherman goes to work he drops his decoy well toward the bottom, or as far as he can see it, which is a long distance in the clear, still water. As soon as a fish appears, the decoy is moved carefully upward, the darkness of the closed shanty preventing the fish from seeing the movements above him, while he can be seen as distinctly as if he were on the surface.

When the fish hesitates, the decoy stops; if the fish starts forward, the decoy is drawn farther up. If he retreats, it is lowered toward him. Thus the trick is played until the fish becomes excited and rushes in upon the coveted prey. The line is then rapidly hauled in until the knot reaches the fisherman's hand, when he grasps his spear and drives it into the back of his game.

The fish thus speared are now chiefly pike, although along the Straits of Mackinac many lake trout are still speared in winter, and in some places whitefish are caught in this way, but only rarely, as they are not a game fish and are protected by law.

But when white men first came to Saginaw Bay to fish they caught large quantities of splendid trout, the largest ones weighing from fifty to seventy pounds.

CHARLES ELLIS.

Dog-Sledges in Michigan.

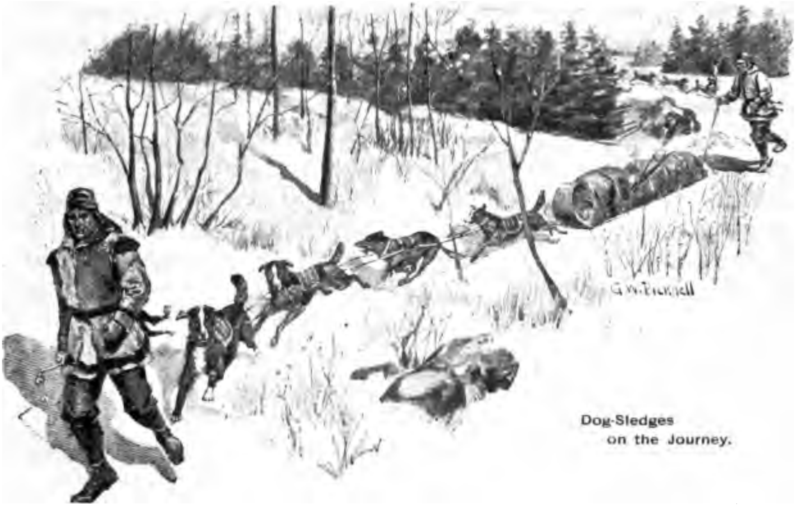
Although dog-teams are no longer used in the lower peninsula of Michigan, they have not ceased to be employed near the Straits of Mackinac and in the upper peninsula. Until fifteen years ago, when the railroads were pushed through the forests as far north as Marquette, dog-trains were necessary for carrying the United States mails. They are still an important motive power in many remote places where canoes in summer and dog-sledges in winter are the only methods of travel.

In my early life in Saginaw, the coming of the dog-train from Marquette was one of the sensational events of a winter in the pine woods. These trips were made at intervals of two weeks from the closing of navigation in November until its opening in April or May.

Saginaw was at one end of the route, and I have often seen the weary dogs climb the river-bank at the close of their tedious journey of ten days. For safety they had to travel near the shore, and often upon the ice, so that the length of their route was estimated at six hundred miles, though the distance between Saginaw and Marquette by rail is only about three hundred and seventy-five miles.

The sledges in use at that time were shaped like toboggans, and were each ten feet long and about fourteen inches wide, with the front curved. These sledges were the property of the United States government, and their chief mission was to carry the mail, which was packed in close parcels, covered with waterproof canvas, and tightly strapped to the sledge, the whole being lashed with buckskin thongs to a leather band fastened to the edge of the board.

The sledges always went in pairs, each having four dogs and two couriers. These men were half-breeds and wore a costume peculiarly their own. Over heavy woollen underclothing they wore a coat made from a Mackinac blanket, usually gray with black stripes; a hood of the same material was attached to the back of the coat's neck, and this hood was drawn over the fur cap at night or in very cold weather. A bright red scarf girded the waist. The breeches were of tanned buckskin; the feet were well protected by deerskin moccasins and several pairs of heavy stockings, the outer pair of a bright red.



Dog-Sledges on the Journey.

Snow-shoes were always included in the outfit, being necessary where snow was deep.

The dogs travelled tandem, with harness of collar, back bands and traces. Sleigh-bells were attached to the collars, which were frequently ornamented with bead work and gay worsted tassels. The best dog was called the leader; the rear dog was called the steerer, as he often had to display ingenuity in keeping the sled upright in difficult places.

The regular sledge dogs are a peculiar breed, known as huskies, supposed to be a corruption of the word Eskimo, and are derived from dogs of Eskimo stock. They have small heads, long noses, short but pointed ears and bushy tails. Their cry is a yelp rather than a bark, and is thought to resemble the noise made by a wolf.

While faithful to their task, they are quarrelsome, and are not generally treated in a manner to develop the better side of their nature. They are not guided by reins, but entirely by the voice and whip; hence they are shouted at and shrieked at in French, Indian and English.

One courier runs before the team, the other follows the sledge, often aiding its progress by means of a long stick which extends from the rear at an angle of forty-five degrees.

When semi-monthly trips by dog-team supplied, for six months each year, the only means of communication between the world and the people in our northern wilds, the returning sledges were usually loaded with accumulated papers and magazines. Other parcels were often carried as freight for a stiff price. Occasionally there would be a passenger, if that word can be applied to a man who paid from five dollars to fifteen dollars for the privilege of accompanying the sledges.

The route was through a trackless forest or over great fields of ice, with at least half of the nights to be passed under no shelter but the pine-trees and with a snow-bank for a bed. Provisions for both men and dogs were always carried; the food for the dogs consisted of Indian meal and tallow.

Men and dogs showed great powers of endurance, making forty, fifty or sixty miles a day, according to the condition of the snow and ice, and doing the whole journey with much regularity. Nothing short of a most extraordinary storm retarded the arrival and departure of the mail-trains. In a storm, or if bewildered in regard to location, the couriers trusted entirely to the dogs, who never failed to keep the right course.

Nowadays, for short journeys sleds mounted on runners are used, but they would not be serviceable in very deep or soft snow. While dogs are not so necessary to the settlers as twenty years ago, they are still employed in the northern part of the

State. The fishermen all along shore keep dogs to carry their catch to market, and to bring wood and other supplies to their isolated huts.

There are many fine teams kept for the pleasure of their owners, who consider them more desirable than horses in that cold region, as they can lightly pass over great drifts of snow and brave the wildest storms. Missionaries frequently employ dog-teams. In 1896 one of them travelled nearly four hundred miles with his dog-sleigh through the wilds of northern Michigan.

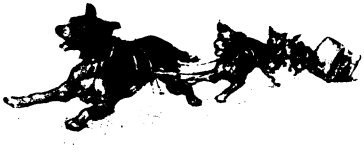
Turk and Punch were with difficulty broken to the work required of them. In telling me of his experiences in travelling, the missionary said:

"While at work the dogs are fed but once a day, and that at night when their work is done. This does not in any way betoken cruelty to the dogs, for they do better work, with less fatigue, than if they were fed three times a day. My dogs weigh over one hundred pounds each, and were in a much better condition at the end of the season than when they started out.

"Turk took kindly to his duty from the first, springing to his proper place the moment the sleigh-bells were heard; but Punch would growl and snarl, and had to be forced each time to his position by the side of his amiable mate, who patiently awaited the word, 'Go!'

"Then, with little impatient yelps and sleigh-bells jingling, they bounded over the huge drifts of snow, through the pathless woods, often making eight miles an hour."

MERCIA ABBOTT KEITH.



The Ishpeming Dog-Race.

The upper peninsula of Michigan, that great stretch of big pines, barren plains and rugged hills seamed with mineral riches, has one custom which is probably unique. It is the annual dog-race, which is regularly held at the beginning of the year in several of the larger mining towns.

Its origin dates back to the times, not more than a half-century ago, when the Canadian French and the Chippewas were almost the sole residents. The Indians lived as they did in the days of Hiawatha, except where the patient missionaries had founded little churches, around which clearings had been made, and half-civilized and half-Christianized Indians were gaining a living, partly by the chase and the trap, and partly from the products of their little farms.

The French settlers were trappers and farmers, and their means of gaining a livelihood and their manner of living differed little from that of their dusky brethren.

In those days the sailboat and rowboat in summer, and the dog-train in winter, were the sole means of transportation. The government mails were carried at stated intervals by hardy half-breeds or equally hardy Canadians in their boats or upon their backs in summer, while during the long winters, beginning in November and rarely ending before May, the dogs were compelled to take the burden. Sometimes strongly-built sledges of home manufacture were used, and as frequently the Indian toboggan was pressed into service.

In the larger mining towns, such as Ishpeming and Calumet, the annual dog-race is looked forward to in winter with almost as much pleasure by Young America as is the Fourth of July in the summer-time.

In Ishpeming at one New Year's festival, although the day was bitterly cold, with a furious wind seeking the ears and noses of the people on the streets, five thousand persons assembled along the race-course, which was on Bank Street. The windows of the buildings facing on the street were crowded with ladies and children, while even the statue of the Chippewa chief on the square upheld several enterprising youngsters, who there obtained a good view of the start.

With great difficulty the line was formed. The entries in the first class were thirty-two in number; and the line of dogs, sleds and boys stretched across the street. The judges and starters were assisted by the marshal, in his fur overcoat and fur cap, while policemen stood conveniently along the course to keep back the overeager spectators.

The Big Newfoundland Leads.

The sight was a strange one. Boys of all ages from eight to sixteen were seated upon sleds of all styles, including several of home manufacture. Attached to these sleds by harness and tackle of every variety, from the made-to-order leather harness to the hastily-constructed gear of rope and twine, were dogs of all sorts and conditions. There were sorry curs of low degree, and shaggy Newfoundlands; there were huge mastiffs and slender greyhounds; and every dog and every driver were bursting with anxiety for the word to start.

The starter said "Go!" and the dogs went. Four or five of the number shot swiftly forward, others travelled more slowly. One huge St. Bernard made a desperate leap which was too much for the worn harness, and his young driver was left behind. Another boy was caught off guard, and left rolling in the snow while his steed was dragging an empty sled toward the turning-point. Two other dogs started at cross-purposes, and dogs, boys and sleds were tangled in a snarl which lasted till the fleeter racers had reached the turning-point, three blocks distant.

Of the number entered, but five or six displayed genuine racing qualities. One poor youngster, whose dog was well to the front, was sorely disappointed when his Towser, despite urgent entreaties and the liberal application of a whip, turned at the last corner before the goal and ran home at the top of his speed. That dog went supperless to bed that night. His youthful master faced the gibes of an unfeeling public, composed of his young neighbors at school, the next morning.

The second heat was almost a repetition of the first, though the starters were ten less in number. A big Newfoundland came in ahead both times. His driver had no whip, and needed none. Even boys who drive dogs sometimes learn that neither boy nor dog can have his best endeavors brought out by the use of a lash. The boy who learned this lesson was richer, a half-hour later, in the possession of the best suit of clothes that could be found in the city, for that was the first prize.

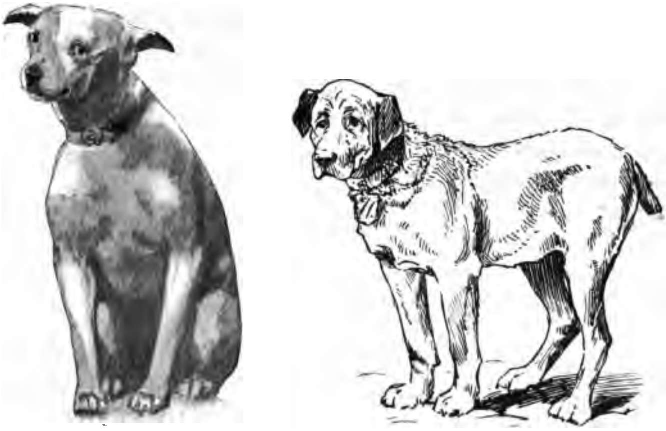
The races continued for nearly two hours, the entries growing fewer in number toward the last, while the racing was better. The boys owning refractory dogs, or dogs unnerved by the presence of five thousand spectators, were compelled, reluctantly, to withdraw from a hopeless contest. From the side streets there frequently arose howls from luckless dogs, suffering chastisement at the hands of their aggrieved drivers.

At last the races were over. Skates, sleds and dog harnesses were the prizes. The last prize was a mammoth soup-bone, and it was expressly stipulated by the management that this should be for the exclusive use and enjoyment of the winning dog, and not the boy.

The competition for this prize was not so brisk as when sleds and skates were at stake; but there were four entries, and a mangy yellow cur that had never been in sight of the quarter-pole before that day trotted off with the soup-bone.

His ten-year-old owner and driver — for this was a gentleman driver's race, only owners being allowed to act as jockeys — went home with tears in his eyes and the firm conviction that his beast could have easily won for him that suit of clothes, but preferred, out of the meanness of his canine nature, to win the soup-bone for his own carnal enjoyment.

HORACE J. STEVENS.



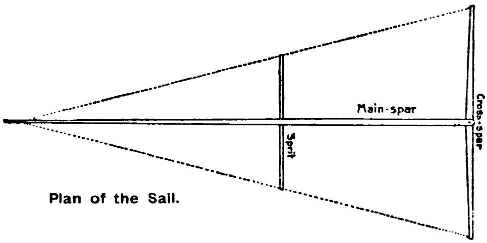
Neither Won.

A Wisconsin Skate-Sail.

Of skate-sailing in general less needs to be said now than a dozen years ago. It is a wonderfully fine and fascinating sport, based on the longing for wings. Who can stand skate-shod on the ice with a fresh breeze blowing, and not feel that longing? But although many of us boys had long felt that desire, it was only with the introduction of the form of sail of which I write, and which is used by the boys in Wisconsin, that skate-sailing came into great popularity among us.

Our sail is, to describe it in the simplest terms, simply a triangular piece of cloth, stretched on a T-shaped frame, carried to windward but unattached to the body. One of its chief merits is its simplicity. Yet it has other excellent qualities; I know of no other form of sail with which so large a wind-surface can be carried with such complete safety.

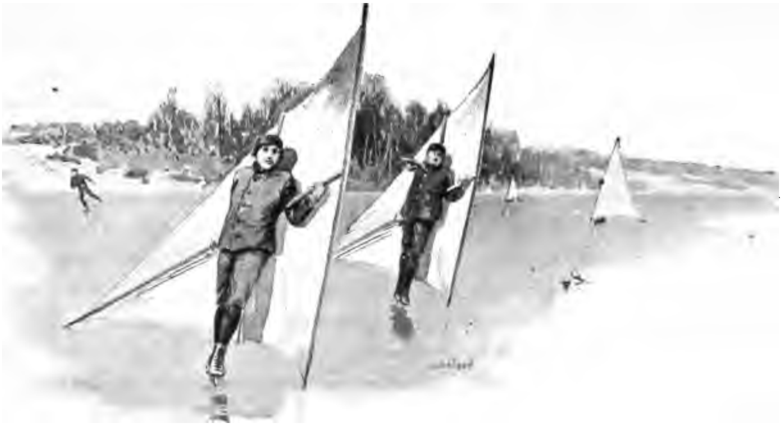
It is a safe sail because it is unattached to the body; with a little experience one can even drop it upon the ice if it becomes necessary. In using a sail which is fastened to the body there is always the danger, especially in a gusty wind when skate-sailing is at its best, of one's sail becoming unmanageable.



Plan of the Sail.

The frame consists of two pieces. The length of the cross-spar should be about twice the distance from the ground to the armpit of the boy as he stands upon skates. Thus, for a boy of sixteen the cross-spar should be perhaps eight feet long, and the main-spar should be twice the length of the cross-spar. The sail should be made of heavy unbleached muslin or sheeting, cut of such a size that, after hems have been made all around, the sail shall be a trifle narrower at the wide end than the length of the cross-spar, and about a foot shorter when stretched than the main-spar.

The sail is carried on the windward side of the body, the main-spar being held under the arm about three or four feet from the forward end. The lower end of the cross-spar comes a few inches above the ice; the rear end of the main-spar drags.



Sailing Before the Wind.

The centre of resistance is about one-third of the distance from the forward end. The whole problem of steering is involved with one's relation to this point.

If you are going directly before the wind, you should be just at this point. If you are tacking, you should come a little forward. If you would come into the wind, steer closer with your skates and come to the front of the sail, when, of course, all the wind is spilled behind. To come about, the sail is shifted to the other arm by being passed over the head and turned upside down. There is always perfect safety so long as you are able to come forward of the centre of resistance.

Now, if you are ready let us take a long flight up the river.

There is a strong and gusty gale, the kind of wind that makes you love the sport. The hard surface of the ice stretches out before us far and wide, polished and smooth, and ringing, when struck, like a plate of finely tempered steel. We are off!

How the wind rushes! But we know you of old, Boreas! Many a time have we wrestled with you upon this glassy arena! We speed away with a swoop, the sharp steel hissing, the wind stinging our faces, the spray from our skates whirling over the surface. Braced with all our strength we lean far over upon the wind. Yet a stronger gust has seized us, and we are whirled away like leaves across the ice.

But here we are at the end of our course, and we rush up into the wind; it howls and roars about us, and the sail shakes and quivers. Again we are off on our wild flight back.

There is joy in an ocean-swim, through the surf and out upon the great waves. There is joy in swimming in the brown water of some Northern river among great, fragrant logs. I remember moments when tearing over the ice on skates after a shinny-block seemed the most glorious thing in life.

Again, there are the memories of long skatings off into the sunset, with fine feelings of freedom and power. Or our skates have led us on into quiet bayous, which stretch back into the depths of the solemn forest. We linger to watch the colors in the west through the branches and among the great trunks of the elms. Then, as we turn homeward in the phantom light of the moon, we hear the reverberating cry of the great owls, and the river begins solemnly to boom with the settling down of night.

Among a host of such happy memories I count many a glorious sail on skates.

A. W. Whitney.

A Trip to Lake Superior.

The first of July found me sitting on the forward deck of a fine, stanch steamer lying at her dock in Detroit. I was surrounded by fishing-rods, reels, rubber boots and the usual equipments of fishermen. With me was a young companion, Arthur Denison: we were bound for a trip to the Lake Superior country.

Passing through the turbid waters of Lake St. Clair, by Port Huron and Sarnia, we soon found ourselves tossing upon the angry waters of Lake Huron.

The next morning early we were at a small island noted for producing more raspberry jam than any other manufactory in the United States. The berries were picked by the Indians and manufactured into jam by the thousands of gallons annually.

Once more under way, and we soon entered the St. Mary's River, and in a few hours were at the rapids, waiting at the mouth of the canal for our turn to pass through.

As we were obliged to wait an hour or two at this point, we took a stroll, and soon discovered several Chippewa lodges, in one of which lived an old squaw, said to be one hundred and seventeen years old.

These Indians earned a precarious living by catching whitefish in the rapids, and making boxes and baskets of birch-bark and a fragrant grass that grows in the vicinity, which they sold to visitors.

We stood on the shore for a while, and watched the Indians catch the fish. Two of them entered a birch-bark canoe, so light and frail that it seemed almost as fragile as an egg-shell. They paddled up until they reached the first fall in the rapids, then one of them took his place in the prow with a scoop-net, and the other steadied the canoe with his paddle.

The Indian in the prow stood so motionless that Arthur thought he must be asleep; but suddenly we saw the net descend, and in a moment it rose all dripping with water, and a fine large whitefish was deposited, gasping, in the bottom of the canoe.

Again on board the boat, we slowly steamed in between two high walls of stone, a pair of immense gates were closed behind us, and then the great boat began to rise slowly, and in a few minutes we were in another lock; the great gates again closed behind us, and then we rose to a level with the lake before us. We thus passed around the rapids in the great St. Mary's Falls Ship Canal, and were fairly launched on the bosom of the great lake, whose green waters extended for nearly five hundred miles before us.

Steamer in the Lock.

Just as the sun rose the following morning, the captain called us to come on deck, and a remarkable sight greeted our eyes. Every one asked, "Why, where are we?" and the captain finally told us, "In Le Portail." The great steamer, with its tall masts and smoke-stacks, was in an immense cavern, more than a hundred feet high.

"Look," cried Arthur, "how can the boat stay here? The water isn't more than two feet deep."

But the captain told us that it was more than twenty-five feet deep. Yet so clear and transparent was it that we could see the delicate tints and colors of every pebble on the bottom as plainly as though they lay in our hand.

In a short time the great steamer backed out of the cave, and in a few hours more we found ourselves along the busy docks at Marquette, over which millions of tons of iron ore are annually shipped to the great manufacturing centres of the world.

The captain sent for Steve, a well-known half-breed, who was soon along side the dock with his neat and clean "Lady of the Lake." Our rods, trolling-lines and our luncheons, were soon in the boat. Steve took the oars, and away we leaped over the emerald-green waters.

Before we had been out five minutes, Arthur asked:

"When shall we begin to fish?"

"Good time now," replied Steve, who gave a nod of approval of our "spoons," and overboard they went.

We watched the bright-silvered, gaily painted trolls, as they glistened far behind us in the clear water, and pretty soon Steve said, "That's enough," and we stopped paying out our lines, and anxiously waited for a bite.

Arthur soon exclaimed, "I've got a fish! I've got one! Let me pull him in! Don't touch the line!"

"Steady! Pull steady!" said Steve; and in a few minutes a six-pound Mackinac trout lay flapping in the bottom of the boat.

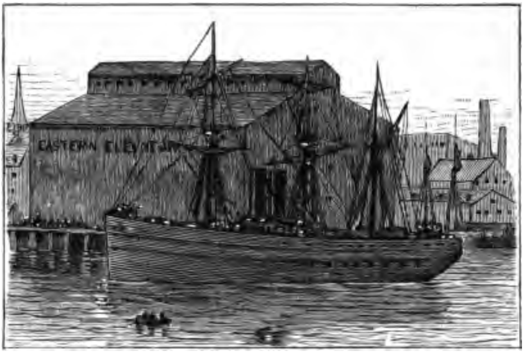
The fish came so fast that our hands grew both tired and sore, and we were glad to hear the guide suggest pulling inshore towards a small rocky island near the mouth of Cart River, that we might try our luck at speckled trout.

Our rods were soon jointed, our reels attached, lines fastened, and in a very few minutes after our keel struck the pebbly beach we were on the rocks. I threw a small black fly with gaudy wings, and it had scarcely struck the water before a noble fellow seized it.

The sport went on, until we heard the hoarse whistle of the

"Ironsides"; and though Arthur declared, "It's too bad!" we took the boat, and Steve soon landed us and our precious cargo at the dock.

Morning found us in Portage Lake, and we visited two of the largest towns in the Lake Superior country, near the richest copper-mines in the world. There all is life and activity, and we saw the locomotive come puffing out of the bowels of the earth with its car-loads of ore.



Steamer at Detroit.

On our way back we visited the Minnesota and National mines, where we descended the shafts to immense depths, and saw the grimy miners, with their little safety-lamps fastened in their hats, as they delved and toiled for the precious ore, some of which contains large quantities of virgin silver.

At Ontonagon we met the man who carried the mail during the winter season, and furnished the only means of communication that this thriving settlement had with the outside world during the long, cold winter. He was a half-breed, and with his train of noble dogs and sledge, made an easy sixty miles per day over the frozen crust with his mail-bags.

Samuel W. Cozzens.

Hop-Picking in Central New York.

In many a quaint old farmhouse, from the middle of August until the first of September, numerous preparations are made for the gathering of the hop crop. To the hop-grower it means a season of anxiety and hard work; to the pickers a sort of holiday, combined with the satisfactory prospect of making a little money.

The good wife certainly has her hands full at this time. Every available space is utilized for sleeping accomodations; beds are spread in the parlor, hall and attic, and the male portion of the help often sleep in the hop-house.

The fattest lambs, the choicest chickens, are all sacrificed to appease the hungry pickers. There seems to be a rivalry among the farmers as to who will set the best table. Perhaps it is for their interest to do this, as oftentimes there is a scarcity of pickers, and the farmer who has the reputation for good living seldom has trouble in securing help.

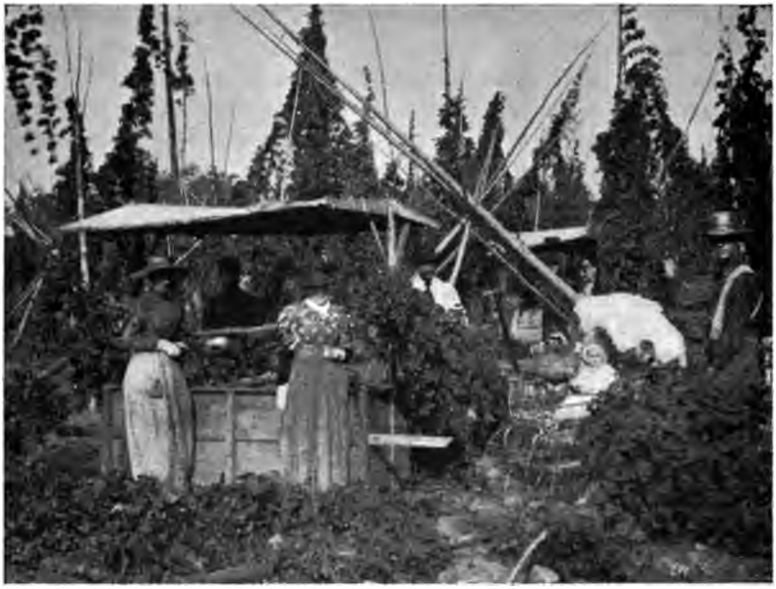
When they are in the condition for picking, the hops must be gathered at once, as a delay of a few days would result in a serious loss to the farmer.

In certain localities near villages the pickers often board themselves, bringing their dinners, and returning to their homes at night; but the majority of the growers board their hands. Almost every one in this section goes hop-picking, the rich and poor, the young and old, oftentimes whole families, in which latter case the earnings are considerable.

It is a pleasant sight to watch the pickers going to their daily task. There are many well-dressed people, matrons, pretty girls and young children, all looking fresh and cheerful, with their lunch-baskets on their arms, all chatting and laughing, and appearing totally unconcerned as to the task before them.

Yonder comes a lumber wagon loaded with a farmer's whole family. Among them is one woman, perhaps seventy years old, bringing her easy chair to sit in while picking. The mother has the baby on her arms, who will soon be sleeping sweetly beneath the graceful clusters of hops.

The hops as they are picked are put into boxes. The main box is divided into four separate compartments or boxes, each holding eight bushels. There are four pickers to a main box, each picker having his own box holding eight bushels. The number of boxes picked by a person in a day depends upon the abundance of the hops, their size, and the ability of the picker. The general average is, perhaps, from two to four boxes per day.



In the Hop-Field.

The wages paid range from thirty-five cents to fifty cents per day when the picker is boarded, or from fifty cents to seventy-five cents when he boards himself.

Every main box has a box-tender whose business it is to pull the poles, strip the vines from them, and keep the pickers supplied with hops. It is quite a responsible position, as it is also his duty to see that the poles are picked clean, the hops in the boxes kept free from leaves and stems, and no hops wasted on the ground.

As soon as a box is filled, it is sacked by the box-tender, the picker holding the sack while the box-tender puts in the hops, carefully picking out every large leaf and stem, and frequently admonishing the pickers to pick their hops a little cleaner. A setting comprises six rows of poles from each end of the box, and three from each side. When these are all picked, the box is moved forward to another setting.

A busy, merry throng they are, with their nimble fingers working swiftly over the vines.

Noon soon comes, the gala event of the day, but none too soon, for the bracing air, the pleasant exercise and the good spirits of the company are all conducive to an appetite that is a stranger to those working in stores and factories in large towns and cities. A shady spot is selected beneath some grand old tree, or in some grove beside a spring of sparkling water, and here a table is spread on the green grass.

Such a variety of good things! Cold turkey, chicken, geese, meats of all kinds, sandwiches, and innumerable pies, cakes and puddings; jugs of cold coffee, tea, milk and lemonade, but never any malt or spirituous liquors. In an experience of twenty-five years, I never saw a drunken person in a hop-field.

The women gossip as they eat, and in the pure air, with the cool breezes from the hills fanning their sunburnt faces, their loquacity seems to be so increased that it would leave any traditional tea-party far behind in the race of tongues.

JOHN H. ADAMS.

Charcoal-Burners.

Charcoal, as made in the forests of the United States, is used principally for fuel in iron-smelting furnaces. In Pennsylvania, for instance, many of the smelting companies own timbered land and employ charcoal-burners, or coalers, as they call themselves, to convert the wood into charcoal.

The men who call themselves coalers are not all directly employed in charring the wood; indeed, the majority of them are simply choppers, who fell the trees and cut them into cord-wood lengths. Thirty men are required through the winter to cut the wood that ten of the gang can afterward char, and these ten are truly coalers. They are generally sons of charcoal-burners, while the choppers are commonly farmers' sons from the neighboring region.

When the superintendent of a furnace has decided how many cords of wood shall be cut from a certain tract, the location of a camp is settled and choppers and coalers gather there. Their first work is building cabins for the winter, as chopping is usually done between November and April. In the spring the coalers are left to deal with the wood, which has been piled in ranks near where it is to be charred.

The cabins are built of logs with mud daubed into the chinks. Smaller logs form the roofs, which are usually shingled with several layers of bark, though I have seen sods used instead. Against the cabin a chimney is built of stones and mud, with a fireplace opening into the one room of the dwelling, which is seldom larger than twelve feet by fourteen. Two experienced men can build such a house in three days.

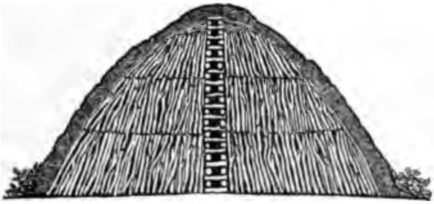
The chimney is the coaler's kitchen; the bunk at the opposite end of the cabin is his bedroom, and his sitting-room is the space between.

Having housed themselves, all hands begin to fell trees, chop them into lengths and pile these, each man keeping his wood in a separate rank or pile. About once a week the wood boss visits the camp, measures the piles and credits each man with the amount he has made. A strong chopper can put up from three to four cords a day, and his wages vary in different years between thirty and forty cents a cord.

In Pennsylvania the choppers leave camp about the middle of April, when the coalers begin to build the pits, which are not holes in the earth, but simply large mounds that much resemble enormous ant-hills.

In constructing a pit the first thing is the building of the chimney. This is formed by laying sticks of wood in a square with the ends crossed, and so placing tier after tier till the chimney is about twelve feet high.

All around this chimney the wood is leaned slanting, as the coalers say, and placed in layer after layer till the whole is about twenty-five feet in diameter at the base. Usually about thirty cords of wood are placed in one pit. Then the wood is covered with a layer of dead leaves and afterward with earth, the purpose being to prevent air getting in or fire showing at any point except such as the coalers may choose. When covered with earth the pit is ready to be fired.


Plan of a Pit

This is done by dropping coals from the top of the chimney upon a little tinder laid at the bottom. As soon as the fire has taken hold the top of the chimney is covered with earth, and no draught of air allowed except such as flows slowly through the covering of leaves and earth.

The coaler must be ever watchful lest the wood, which he wishes to keep smoldering, should burn instead, and so yield not charcoal but ashes. If he sees too much smoke coming from any part of the pit he climbs up on a rude ladder and uses a kind of wooden hoe to increase the thickness and solidity of the earth-covering there. Sometimes a crater appears at some point where the earth has fallen in or crumbled away, then the coaler must stop the hole with more earth. His business is simply to keep the slow fire well banked up.

If the weather be rainy he need not be so constantly on the alert as when it is dry; but if the wind be high he must be on guard day and night. A little neglect may let the banked fire gain such headway that it will largely consume the wood and destroy the prospect of a good yield of charcoal.

Thirteen days are commonly required to coal such a pit as I have described. But if the wood be light and the weather windy a pit may be opened at the end of eight days. If a man is industrious he may coal two such pits a month and earn from forty to fifty dollars, according to the quantity of charcoal, for which he is paid by the bushel.

Unfortunately the tick system prevails in Pennsylvania to some extent; hence the coaler is not always paid in money, but sometimes in tickets or checks for food or goods kept at the store of the furnace company. This pernicious system is disliked by the coalers, though they are usually contented men, who would not exchange their work for any other.

It is usually late in October when the wagons of the furnace company make their latest rounds of the camps and haul away any charcoal remaining at the pits. Then the coalers gather up their few utensils and move on five or six miles, to begin again the round of building, chopping and coaling.

How long charcoal will continue to be used for smelting purposes no one can foresee. But coke has taken its place in many quarters. Nevertheless many experts declare that no fuel is so good as charcoal for smelting pigs that are to yield such a high grade of malleable iron as is used for horseshoes, horseshoe nails and so on. But as steel is rapidly supplanting iron it is probable that the picturesque charcoal-burner will disappear from our forests within a few years.

E. B. FINDLAY.

Natural Gas.

The earliest Jesuit explorers of the Ohio Valley discovered and reported columns of fire issuing from the ground. In 1775 George Washington sought to have set apart and reserved to the public forever a square mile of land in the Kanawha Valley, in the centre of which was a burning gas spring that he regarded as one of the greatest of our national wonders.

The first use of natural gas for domestic purposes in this country was made in 1821 in the village of Fredonia, Chautauqua County, N. Y., where enough of it was collected and piped to supply thirty burners. The village inn was illuminated by this gas when Lafayette passed through Fredonia in 1824. At the same time a small lighthouse on Lake Erie warned vessels from the coast with a flame of the same product.

Natural gas is found in connection with petroleum and salt water deposits, and it was the gas that rushed from a salt-well, bored in Western Virginia in 1841, that was first used as fuel in a furnace. Here it supplied the heat necessary for boiling and evaporating the salt water, and enabled the owners of the well to make salt a little cheaper than other well-owners.

From the earliest development of the Pennsylvania oil-fields a portion of the gas that generally accompanies the flow of oil from a well has been used to heat the boilers of the pumping engines, and to warm and light the dwellings in their vicinity.

For many years, however, it was oil and not gas which the well-drillers were seeking, and they allowed millions of cubic feet of the gas to escape, or burn to waste daily, with little thought of its value. If it was lighted at the end of tall pipes for the illumination of village streets or dark forest roads, no one thought of turning it off at sunrise. By day as well as at night its lurid, torch-like flames burned on hilltops, in valley and forest throughout the oil regions.

In 1874 it was discovered that this fuel could be used more effectively and cheaply than coal, in iron-works, glass-works and other manufacturing establishments. It was not until 1883, however, that the enormous volumes of gas supplied by the Murraysville field were directed through twenty miles of iron pipe to Pittsburg, and offered as fuel for the mills, factories, stores and dwellings of that city.

Gas Light.

With its use for this purpose, the manufacturing business of that large city was revolutionized, its domestic comfort was greatly increased, and its whole aspect was changed. Not only does gas furnish a more regular and intense heat than coal, but furnishes it at a reduced cost, and does away with the labor of handling coal, building fires, keeping them supplied with fuel, and disposing of the accumulated ashes and cinders.

It was not found necessary to make any material change in the construction of furnaces, open grates or stoves. Those built for coal are still used for gas. The only difference is that, instead of kindlings, coal, ashes, cinders, soot and smoke, there is a small pipe that issues from the floor and enters the grate. A stop-cock is turned, the gas is ignited, and any degree of heat required can be obtained at once and regulated at will. When no longer needed the flame is instantly extinguished, and all care of the fire is at an end. With a good draught there is perfect combustion and no odor.

Natural gas is found in both sandstone and limestone formations, at depths ranging from a few hundred to two thousand feet, and is reached by wells bored in the same way as for oil. In fact, it often happens that a well sunk for oil yields gas instead. This was formerly regarded as a misfortune, but the gas has become as valuable as the oil, and drilling for gas is a well-established business.

Striking gas is a somewhat thrilling affair. As the ponderous drill crashes through the thin remaining crust of slate, and liberates the giant imprisoned for ages beneath, the column of gas leaps up the five-inch pipe with such force as violently to project the heavy boring tools, weighing a ton or more, through the derrick frame. The gas, with a screaming roar, springs a hundred feet into the air, a column of bluish vapor. Sometimes it tears the casing of cast-iron pipe from the well, and hurls after it volleys of earth and rock, mingled with jets of oil and salt water.

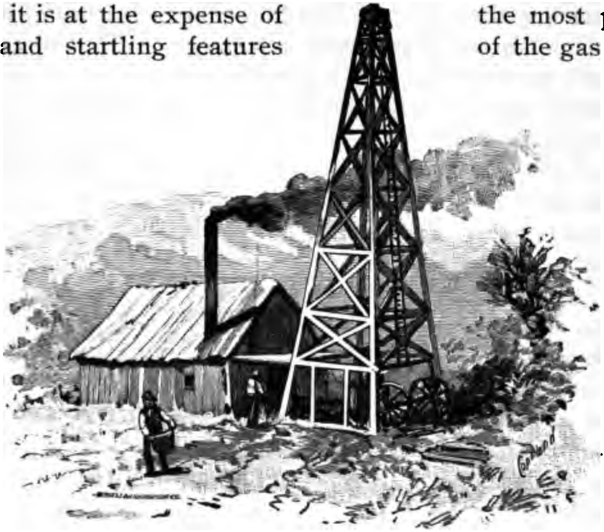
Of course not all gas-wells begin business in this boisterous manner. Most of them are of comparatively gentle flow and easy to manage, though such scenes as the one described are not uncommon in new fields.

The gas giant is fond of fire, and the moment he is loosed from his underground prison he begins eagerly to search for it. If it is found under the boiler of the pumping engine, in the bowl of a workman's pipe, or in sparks struck from flinty rocks, the pillar of vapor instantly becomes a column of flame, throwing out an intense heat, devouring and withering everything in its vicinity, and at night lighting miles of the surrounding country with its angry glow.

It may burn for weeks, months, or even for years, before its terrible strength is so exhausted that the torrent of flame can be extinguished and its energies subdued to the service of man.

During the past forty years the quantity of gas thus wasted has been enormous beyond belief, or power to compute. But this waste is now almost wholly checked. Devices have been perfected and adopted for seizing and controlling the vapor upon its first appearance in the well, and before it has drawn a single breath of air, without which its ignition is impossible.

Even the vast columns of flame that for so long baffled the efforts of the gas men can now be surely and safely extinguished, so that the gushers and roarers of new gas fields, with their pressure of four or five hundred pounds to the square inch, are conducted through a network of pipe lines to the scenes of their future usefulness without loss of time or money, though it is at the expense of the most picturesque and startling features of the gas fields.



Drilling a Gas-Well.

A singular spectacle was afforded by a well bored at Gambier, Ohio. The well, not having been tubed, repeatedly filled with water, which was ejected by the rush of gas at regular intervals of one minute. An intermittent fountain of mingled gas and water one hundred and twenty feet high was thus formed. In winter the derrick above the well became so completely incased in ice as to form a transparent chimney. By cutting a hole at the base of this ice chimney, and igniting the gas as it rushed upward, an effect was produced that at night was weird and beautiful beyond description.

Another fascinating picture is made by the miniature aurora borealis that appears in the vicinity of blazing gas-wells on clear, cold winter nights, when the air is charged with minute ice crystals. The darkness glows and sparkles with broad bands, streamers and brilliant points of light reflected from the innumerable tiny frost diamonds that dart to and fro, waver, disappear, and flash into brightness again in the most bewildering manner.

The reservoirs of natural gas were once thought to be inexhaustible. It was even maintained that the gas is produced in the underground laboratories faster than it can be used. This view is not now held. Wells have been exhausted and have ceased to flow, and often the supply from a new one is diminished as soon as another is sunk in its vicinity. However, no community which has once enjoyed the blessings of a gas fuel will willingly return to the use of coal.

Gas has become almost a necessity, and human ingenuity is now at work in a thousand directions to invent methods for producing it cheaply and abundantly from coal or other materials in order that, when the natural supply is exhausted, an equally good artificial supply may take its place. Communities which cannot obtain natural gas are already demanding an artificial product that shall give them equal advantages with localities supplied by nature with this perfect fuel.

Gas stored in portable tanks is being used as fuel beneath the boilers of locomotives and steamboat engines, and indications point to its substitution for coal in the near future on a still wider scale than at present.

KIRK MUNROE.

An Oil-Country Crater.

" It is far grander than an eruption of Vesuvius that I once travelled many miles to see ! " exclaimed a lady, as she pointed in awe and admiration at the gigantic cornucopia of coal-black smoke which towered gracefully thousands of feet into the heavens from the top of a burning oil-tank.

Surely few spectacles can compare in grandeur with that afforded by thirty-five thousand barrels of crude petroleum aflame in a mammoth amphitheater of iron; but such a spectacle occurs as often as twice a year in the oil country, in places where large quantities of crude petroleum are stored, and in the case of nearly every such conflagration a flash of lightning causes the outburst.

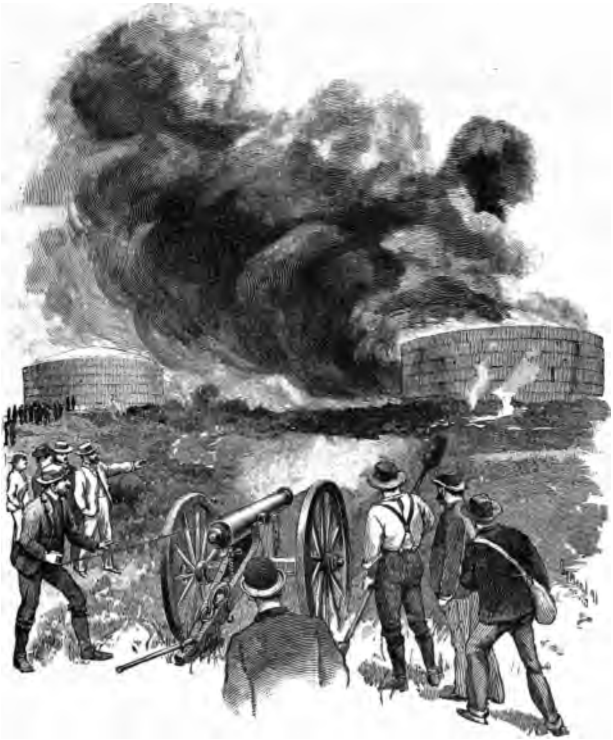
Storage tanks are constructed of huge sheets of iron riveted together tier upon tier. They resemble gigantic seal-brown cheese-boxes. A roof of wood covered with thin sheets of iron, having a slight upward slant toward the centre, keeps out the storms.

If lightning strikes the tank, the gases which emanate from the oil are ignited, and explode with a loud report. The roof is blown off, and in an instant the great caldron of petroleum has an aureola of marvellous beauty.

If the air is clear and still, the pillar of smoke arises straight toward the heavens like a black waterspout, slowly expanding as its lofty head touches the clouds.

The burning tank is often surrounded by many other tanks, and unless prompt and vigorous action is taken the tank will overflow in a short time; a column of suddenly liberated gases will flash thousands of feet into the heavens for an instant, converting the whole neighborhood into a fiery furnace, and the burning oil will pour over the edges of the tank and sweep the ground in all directions, destroying everything in its pathway, and firing the adjacent tanks.

To guard against such a disastrous overflow, the employés of the owners of the tank work very hard indeed. If the tank is not already surrounded by a deep trench and a high bank of earth, a large force of men, furnished with picks and shovels, hurriedly dig the protecting ditch, piling the earth upon the side more remote from the tank.



Puncturing the Tank.

Meanwhile, the pumps at the nearest pumping-station are hard at work drawing the oil from the bottom of the burning tank through a pipe, and despatching it elsewhere for storage.

If apparatus for fighting fire is at hand, cooling streams of water are directed against the red-hot sides of the tank by firemen who lie behind hastily erected shields of wood, through which holes are cut for the passage of the hose-pipe. Meanwhile, horses and men have been despatched for the nearest cannon. The gunners hastily load the brass field-piece, ramming home a solid shot or a great slug of lead. The muzzle of the piece is depressed so that a glance along the barrel strikes the bottom of the great iron caldron, and the bombardment begins.

Again and again the lower tiers of the tank are punctured by the shot, and at each report slender streams of oil and volumes of gas pour forth and burn harmlessly. This action is taken to prevent or delay the dreaded overflow; and the ditch and embankment are intended to check the burning streams of oil in their rush toward the other tanks, if the overflow occurs.

The overflows are regulated by conditions of which engineers have no certain knowledge. Nevertheless, it is believed that the surface of the oil undergoes a constant change while burning, the lighter parts being consumed, and the heavier parts remaining in the form of a dense, heavy scum. Powerful gases generated from the lighter parts below in the great caldron are gradually confined by the thickening of this surface scum, until, steadily accumulating and expanding by reason of the constantly increasing heat above, they force their way irresistibly upward.

These vapors, which rise from ordinary petroleum at as low a temperature as forty-five degrees, are by and by brought into contact with the under surface of the thick scum, which is heated to a temperature of one hundred and fifty degrees, and by reason of this sudden contact they expand with frightful rapidity and power, causing an explosion that forces the thick scum and a flood of light oil over the sides of the tank, and drives every living creature out of the neighborhood.

The puncturing of the sides of the tank allows much of the powerful gas to escape, and the overflow is either prevented or made less formidable. One of the most dangerous features of an overflow is the fact that, aside from a slight diminution of the heat, the terrible visitation is as unheralded and swift as the lightning flash that fired the crater. Firemen, pipe-line employés and spectators who are anywhere within a thousand feet of the tank flee for their lives when this explosion takes place.

During the overflow of a thirty-five-thousand-barrel tank in the Acme Refinery Yard at Olean, New York, in 1880, leaves upon trees a quarter of a mile distant were shrivelled by the intense heat.

Fortunately the terrible visitation continues but a few seconds. If it lasted long, the destruction of property and loss of life would often reach frightful proportions.

Olean has been for many years the largest storage point for crude petroleum in the world. It is almost encircled by huge iron tanks, each containing thirty-five thousand barrels of oil. There are, I believe, four hundred or five hundred of them, and they dot the hills and unpopulated districts about the town.

To the westward, along the banks of the Allegheny River, lies one of the interesting sights of the oil country, a City of Tanks. At this point the iron receptacles are stationed with geometrical accuracy in long rows, like the houses of a town, and the open spaces between the rows resemble streets.

EARLE H. EATON.

The Mound-Builders.

In the states south of the Great Lakes there are a great many artificial mounds. They differ much in size, some being insignificant mounds a few yards in diameter, while others are huge earthworks, like the one in Ohio called Fort Ancient, the embankments of which extend nearly three miles in a straight line, or like the Cahokia Mound in Illinois, just across the river from St. Louis, which is one hundred feet high and covers about sixteen acres.

The mounds vary as much in shape as they do in size. Some are almost conical, with steep sides; some are oval or rectangular, with gently sloping sides, and some are mere terraces of earth.

Others may be mentioned which are not properly to be classed with mounds at all. They are simply figures in relief of animals and birds, made by banking up the earth in such a way as to form rude outline effigies.

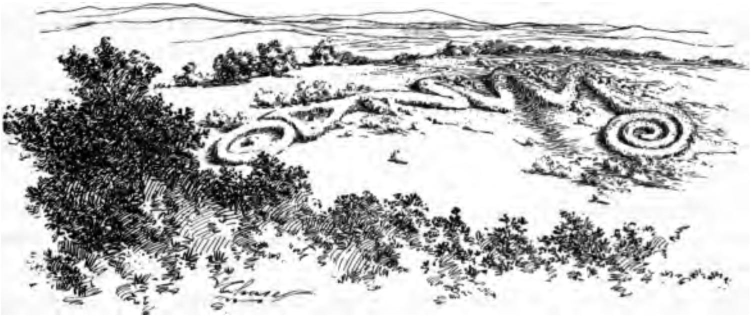
Thus differing, it is evident that the mounds cannot have been erected for one purpose, but that their uses, if not so varied as their size and shape, were at least manifold.

From the earliest times of white settlement, the mounds have been objects of speculation and inquiry, and many conjectures have been made as to their origin and purpose, but for a long time they were enshrouded in mystery.

When questioned as to their origin and use, the Indians are said to have professed utter ignorance. The mounds were in the country when they came, they said; but when and by whom and for what purpose they were made, they did not know. So these ancient monuments came to be regarded as connected with a race different from the Indian, which had previously occupied the country and for some mysterious reason had left it.

Some thought that the builders of the mounds had been exterminated by the fiercer and more savage Indian tribes; others thought it more probable that they had been driven away to Mexico and Central America, where they were supposed to have become so far civilized as to be able to construct the wonderful temples and houses of that region.

But within recent years another and very different opinion respecting the mounds and their builders has gained ground, until it has nearly supplanted the old one. This is that there is nothing so very mysterious about them after all. As students came to study historical records a little more closely, it was found that not only did certain of the Indian tribes know much about the mounds, but that they were the actual builders of some of them.



Serpent Mound in Ohio.

Moreover, when some of the mounds were dug into and objects of European manufacture found far beneath the surface, it became evident that these must have been built since Columbus made his mistake and called our aborigines Indians because he supposed he had landed on the shores of India.

At present it is held that many of the mounds were built by the tribes which were found in possession of the country when it was discovered by Columbus, and that the older mounds about which Indian tradition was silent were simply those which were raised long ago by the ancestors of the present tribes; in short, that all the mounds are Indian mounds, and that to acquire a knowledge of their uses and the meaning of their contents we must study Indian habits and customs. To interpret these habits and customs correctly is to read the riddle of the mounds.

Thanks, then, to the earnest labors of those who have patiently explored the mounds themselves and of others who have diligently studied living tribes and searched into musty historical records, it is now possible to explain the chief motives of those who raised the mounds, as well as the uses of many of the curious implements found therein.

Doubtless much yet remains to be done ere the past can be fully reconstructed, and we can claim to know all the secrets of the Mound-Builders, if indeed so much as this is ever to be hoped for. But, judging from the success of past years, the future is full of promise.

It was soon found that a very large number of mounds were simple burial-places.

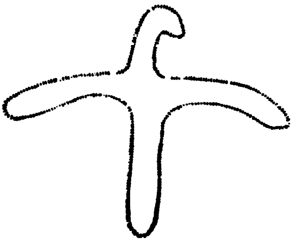
While the notions held by our Indians respecting a future state agreed in a general way, there were yet many minor differences. All seem to have believed that the existence of the individual did not cease with death, but that there was another life more or less closely resembling the present one.

According to Indian ideas, the present body was closely connected with this future existence, and all tribes paid great attention to the proper burial of their dead. Many tribes burned the bodies, as did the old Greeks and Romans. Some deposited them upon scaffolds out of the way of wild animals; others laid them carefully away in caves; while still others buried them in the ground.

But whatever their form of burial, all tribes paid particular attention to the care and protection of the bones. It was natural that they should, for the bones are the most imperishable part of the body, and with them is closely connected the idea of a spirit, or soul, as we call it, crude though that notion is in Indian philosophy.

After much ceremony, and doubtless with much lamentation and many tears,— for savages are very demonstrative in their grief,— the body was placed on the ground or upon a terrace of clay. Around it was gathered the property of the deceased, especially those articles which were considered useful in his after life, such as a water-vessel or two, some food, paint for decorating the body, and so on. A fire was then built over the whole, and after it had burned long and fiercely, earth was brought in baskets and heaped over all.

Thus the heap of earth above it served two purposes: to protect the remains, and as a monument. Doubtless the richer and more distinguished the deceased, the larger and more imposing the mound.



Bird.

It was the habit of many tribes to bury their dead in the ground or expose them on scaffolds until the flesh disappeared; and then, perhaps at stated intervals, to gather the bones together and deposit them in an indiscriminate heap. On these occasions their friends sacrificed such objects of value as were most appropriate, or such as would best express their grief and love. Thus the mounds often mark the last resting-place of a group of persons who probably were connected by tribal or kinship ties.

Some tribes buried the bodies outstretched in a horizontal posture; others folded the limbs tightly against the body; and others still wrapped the bones into a compact bundle. Some buried in stone receptacles; others enclosed the body in bark or in rudely woven blankets and clothing.

All of these methods appear in the burial-mounds. Fortunately, when the bodies were cremated, in many cases the fire only half did its work, and many of the objects sacrificed on these occasions have been unearthed, as well as many of the skulls and half-charred bones.

The list of objects taken from the mounds includes everything dear to the Indian mind. That it was believed the deceased would need his weapons in the next world or on his way there is evident from the numerous arrow and spear heads found. Personal ornaments were deemed essential, and vast numbers of shell beads, pearls, copper trinkets and stone carvings of ceremonial or religious import appear in the mounds.

The Indian was always fond of athletic games as well as those of more questionable morality, such as gambling; and objects used in these games are of frequent occurrence. Everything cherished by the Indian as a protection from the evil and disease spirits, by which the Indian world was peopled, was carefully included, and charms of various sorts are commonly found with the bodies.

Many of the objects found in the mounds, such as the carvings, are finely made, and show much taste on the part of their makers. Before these had been carefully studied, it was assumed that they were finer than anything the Indian produced. This conviction strengthened the opinion that those who made the objects could not have been Indians.

But those who maintained this opinion forgot that the first and inevitable effect upon a savage people of contact with civilization, is to deteriorate their manufactures. The savage, finding the tools of civilization better, gradually ceases to make his own; and as he abandons them, he loses his old skill, and becomes indifferent to beauty and nicety of finish.

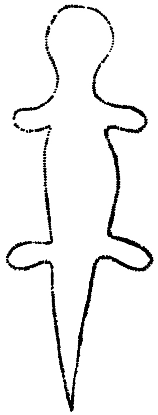
When, therefore, the most artistic and best finished objects from the mounds are compared with similar ones made by Indians whose handiwork has not suffered by contact with civilization, Indian art suffers little or nothing by the comparison.

To raise such immense works as the Cahokia Mound must have required great labor, and the size of the mounds has been urged as a reason to suppose that Indians could not have produced them. But it would require no more labor for a comparatively few men and women to throw up a mound in a long time, than for many to build it in a short time; and no doubt to build such mounds as that of Cahokia must have required many years, perhaps successive generations.

Moreover, the very rude methods employed in mound-building are strikingly suggestive of Indian work. In the case of certain mounds, it has been possible to trace the successive baskets of earth as they were dumped from the shoulders of the dusky carriers.

In many places there are embankments of earth in the shape of squares or parallelograms, the appearance of which too closely suggests rude fortifications for their purpose to be mistaken. They were defensive works, places of refuge. Such in fact was Old Fort Ancient, which may have been the work of generations of Indians; and within its ample interior were probably gathered, in times of danger, the tribes that inhabited the neighboring valleys.

Evidences of village sites within its enclosure indicate that in troublesome times villages were established and occupied for considerable periods. Doubtless grounds were prepared for the celebration of such feasts, councils, games and ceremonials as always attended Indian social, religious or tribal proceedings.



Otter.

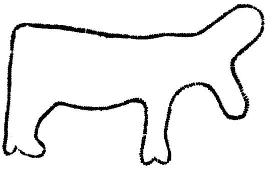
There is another class of mounds of various shapes and sizes, which apparently were the sites of large houses, where dwelt together several families of the same clan, or of council-houses, which were partly for religious and partly for social use.

Most curious of all are the Effigy Mounds in Wisconsin, a group of which, found in Grant County, in that state, are shown in the illustrations. These relief figures of beasts and birds are often made on a gigantic scale, and from the nature of their construction are necessarily so rude that they can rarely be identified as of any particular species, and the attempt to identify them has often resulted in false conclusions.

Thus one mound in Ohio long passed as the effigy of a mastodon or elephant; and as this creature has been supposed to be extinct for a considerable period, the effect of this identification was to bring the existence of the animal down to a very recent date, perhaps to historical times, or else to carry the origin of this particular mound far back into the past.

Now, however, the proboscis of the animal, upon which chiefly rested the theory of its elephantine nature, has been determined to be a slide of earth. So the effigy passes from the list of the marvellous to take its proper but prosaic place in mound history as the figure of a bear.

As to the purpose of erecting these banks of earth in the shape of animals, students appear to be pretty well agreed. Most Indian tribes have myths by which they trace back their origin to certain animals, as bears, otters, snakes and birds.


Bear.

The figures of these supposed ancestors became totem marks, and are tattooed on the persons and pictured on the houses and other property of the Indians. The well-known totem posts of the Haida Indians of Alaska are good examples.

Instead of contenting themselves by carving their totems on their houses, weapons or other property, or painting them on their skins, the Wisconsin tribes adopted a unique plan, and raised on the bosom of Mother Earth their effigy monuments, commemorative of their mythic ancestral beliefs. So inscribed, nature has kindly assisted in their preservation; and though other and more costly monuments crumble away, the effigy mounds live on, mute witnesses of the cherished beliefs of a people whose past history is a cloudland of conjecture.

PROF. H. W. HENSHAW.

Mammoth Cave.

On an interesting occasion I received as a gift a velvet case containing a solid silver key inscribed, "From the Manager and Guides of Mammoth Cave." It was a real key of the iron door at the entrance of the great cave.

Thus it happens that I have the privilege of unlocking the gate of the great cave for myself, and freely exploring its nooks and corners; and by the aid of this key I was able to prepare the map of Mammoth Cave which accompanies this article, and from which a faint idea may be had of its winding mazes.

One day I ventured to go alone into the gloomy caverns. No more peril lurked along the familiar path through the main cave than might have been met in almost any rocky ravine. The powers of darkness may be safely defied by a man armed with lamps, braided oil-rags, plenty of matches, and a coil of magnesium ribbon. Fear was tempered to an agreeable sense of awe.

No pause was made till the Star Chamber was reached, with whose fantastic illusions every visitor to the cave is familiar. These were reproduced as long as I desired, with the discovery that the more intense the artificial light, the brighter the stars seemed to shine in the blue sky overhead.

Not one visitor in five hundred advances to the grand portions of the main cave that lie beyond; they all turn back to explore the minor branches. I went on. For a thousand yards there is a succession of noble rooms, strewn with limestone blocks of every size and shape, like the ruins of some old castle of Giant Despair. Here are black chambers, appalling in their funereal gloom.

Turning to the right I approached roaring cataracts that fall from a great height and instantly vanish in a profound abyss. Beyond them arise the walls and pinnacles of the Chief City, once the resort of Indian sagamores and dusky braves, who left as relics their torches, sandals, arrow-tips and battle-axes.

Here I made an experiment that taxed my nerves; I blew out my lamps. The black darkness seemed to become a palpable and solid thing about me. Sounds were magnified; I heard the cave rats scamper over the rocks and the uncanny bats flutter by. The throbbing of my heart was audible. A whisper or a sigh was mysteriously wafted to the farthest limit of the enormous dome.

The excited fancy conjured up all sorts of illusions in the midnight gloom. Ghosts of the Mound-Builders came hovering round. How thankful I was for the box of matches clutched in my fist, a single one of which had power to put to flight an army of goblins! The match was struck, its tiny blaze was applied to the narrow strip of magnesium tape, the towering crags flashed again into view, and above them swelled the proud arches of the Chief City.

Guide at the Entrance of Mammoth Cave.

The solitary intruder into this domain of imps and gnomes was satisfied, and groped his way back safely to the hotel, and the just reprimand awaiting him from the anxious manager.

The regular routes through the cave, one way, do not cover more than twenty miles, while the total length of all known avenues exceeds one hundred and fifty miles. Of the five thousand tourists who annually enter the rocky, moss-grown, vine-clad vestibule, very few wander from the beaten paths which can be comfortably traversed in a day or two.

Almost all visitors hasten past Audubon Avenue, the first right-hand branch from the main cave; yet it equals in grandeur many places over which people go into raptures. It opens from a vast rotunda strewn with pipes, pumps and vats, relics of the saltpetre works of 1812, from which our warlike fathers obtained the means of making gunpowder.

From this avenue miners carted off countless loads of nitrous earth, in doing which they exhumed gigantic skeletons, and had many strange adventures.

If our visit is in winter we are amazed at the myriads of bats that hang, head downward, in broad clusters as dense as swarming bees. They look like sealskin sacks tacked against the ceiling; but when the guide rubs them with his rough hand every tiny mouth flies open, changing the brown robe to a scarlet cushion.

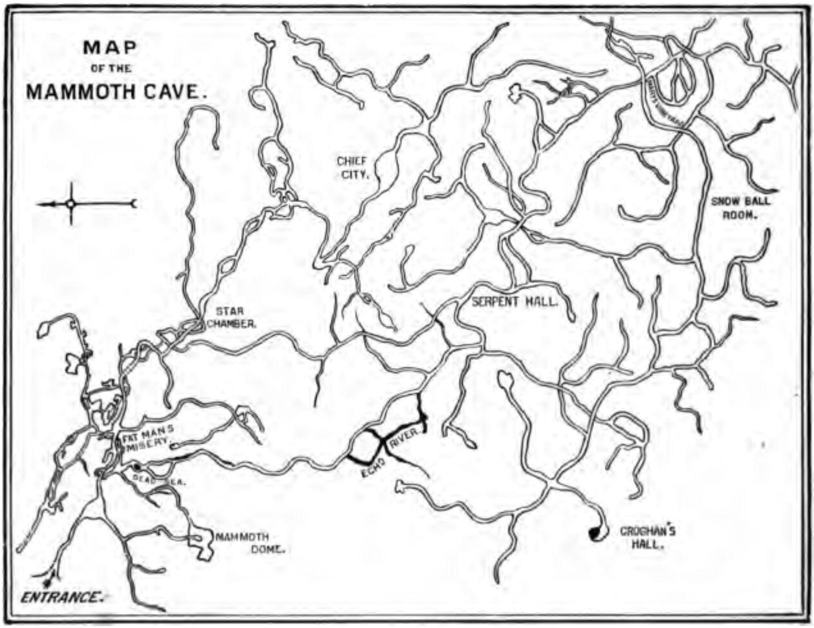
The road is smooth and level. All the rocky slabs are skilfully piled into stone walls. And what are those newly-raked beds, right and left, extending for hundreds of yards under this noble arched way of fifty feet span? We seem to be in a garden many acres in extent, stretching along as far as the eye can reach, even when aided by chemical fires.

This is indeed a garden; it is the Mammoth Cave mushroom farm, on which six thousand dollars were spent under French experts to get it into running order, and whence the manager hopes to supply the markets of our American cities. A shaft for ventilation and irrigation has been sunk from the outside.

That smaller opening from Audubon Avenue leads to the long, winding channel of an ancient torrent, and is called the

Little Bat room. Tread carefully under these low-browed arches, blackened by the torches of the miners. It is a spot from which heedless visitors are wisely excluded.

That ugly black crevice, toward which the floor so treacherously slopes, yawns into a pit down which a reckless miner



once dropped his lamp. A sprightly young negro was lowered to recover it. He returned empty-handed, and having, as it was thought, lost his wits; for he reported having seen a marvellous temple, rivalling the wonders of the Arabian Nights' Entertainments.

But thirty years later that very temple was approached from another direction; at one end of it is a cataract a hundred feet or more in height, while at the other end rise pillars eighty feet high. And on the floor lay the rusty old lamp!

Surprises continually await cave-hunters. Guides plodding homeward one day from Croghan's Hall, the extreme end of the Long Route, were astonished to see a volume of smoke issue from a crevice in the Serpent Hall. They fled hastily across Echo River. There they found workmen pitching a boat and making a great smoke.

This gave them a hint that an undiscovered passage existed between the Serpent Hall and the main cave. The reader will find it indicated on the map; but its true crookedness could not be drawn on so small a scale.

In company with two guides, I completed a survey of Ganter Avenue, as we call this passage. At first the guides thought it to be about four miles long, and it certainly seems so. But it is really eighty-five hundred feet in length, and probably makes a twist as often as once in twenty feet.

It is a combination of three different avenues, on as many different levels. The connection between them is made by a stairway of one hundred solid stone steps, which we named Rider Haggard's Flight, in honor of the author of King Solomon's Mines. The avenue was originally from forty to sixty feet high, and from six inches to ten feet wide.

By assiduous labor Mr. Ganter, the manager, had a stone floor laid midway of the avenue where the crevice widens. The pick and blast were used wherever needed, so that now any one who wishes to do so can thread the entire passage easily.

Its main advantage is that it affords a safe exit from the regions beyond the rivers, in case of an overflow. But even yet portions of Ganter Avenue are so narrow that if two persons meet, one must lie down and let the other walk over him.

"What is there beyond that rocky ledge?" said I to one of the guides, as we stood in River Hall. He replied that he did not know, but would like to find out.

We found a wide, low avenue in which no footprints were visible. Soon we had to go on our hands and knees, crawling through the finest, cleanest yellow sand. It was plainly the dry bed of an ancient river. For half an hour we pursued our toilsome way, till suddenly we came out into Pensico Avenue.

I remained awhile at the Bottomless Pit, amusing myself by throwing fire-balls into it. Being saturated with oil, the balls floated to and fro on the water and lighted up the walls of the chasm grandly. Such chasms are styled pits or domes, according to the point of view. They cut through all the levels of the cavern.

The sandy way by which we had come was one of the higher and more ancient channels by which this subterranean region was formerly drained. The tortuous passage called Fat Man's Misery drained it at a later era. Still lower channels were subsequently found, one opening midway into the pits, and another draining them from the very bottom.

One of the guides made his way through this lowest passage, and found that half a dozen of the pits were united into one vast room which, by special permission of the President, we named Harrison's Hall.

While trying to measure a pit not visited before, a ponderous rock was dislodged just above me, and whirling by so close as to graze my shins, fell more than a hundred feet with a crash into the abyss. Other fragments followed it until the cavernous echoes awakened were like a volley of thunder.

Speaking of echoes, let us take a ride on Echo River before leaving the cave. It is worth a trip from Boston to Kentucky, merely to float for an hour on those magical waters. The phenomena have been frequently described; but most visitors are so in love with their own voices as to miss the finest effects of all.

The guide rows us to exactly the right spot in this long and deep underground river. Here the rocky arches meet the water vertically, and without a shore; but the waves lap musically into a thousand little cavities as we row along.

This is only the gentle prelude. For now, while uttering certain peculiarly mellow vocal sounds harmonizing with the keynote of the passageway, the guide rocks the boat to and fro, so that we must hold to the gunwales to keep from being thrown overboard. And then begins a concert that, if not interrupted, may last fully half an hour.

First comes a sound like the tinkling of silver bells. Larger, heavier bells take up the melody, as the billows caused by the rocking of the boat strike the cavities in the wall. Then it seems as if the chimes of many cathedrals had conspired to raise in this strange place a tempest of sweet sounds.

The music dies away, and ghostly mutterings ensue. Many voices seem to whisper, chatter and cry. They laugh, as if in glee, and anon shriek as if in agony. Then all is silent. We are about to speak, when the guide makes a sign to keep still; and we sit in curious expectation. Lo! as if from some deep recess hitherto forgotten, comes a tone tender and profound; after which, like gentle memories, the mellow sounds that had been heard before awake again, until River Hall rings anew with the wondrous harmony.

Amid the alabaster flowers of Mammoth Cave the fancy finds the mimicry of every blossom, from the modest daisy to the flaunting sunflower. The floral avenues open to the public have been marred by covetous or careless visitors. A rumor had reached me of a secluded chamber, known as Charlotte's Grotto, where the wildest flower dream of the cave-hunter would be realized.

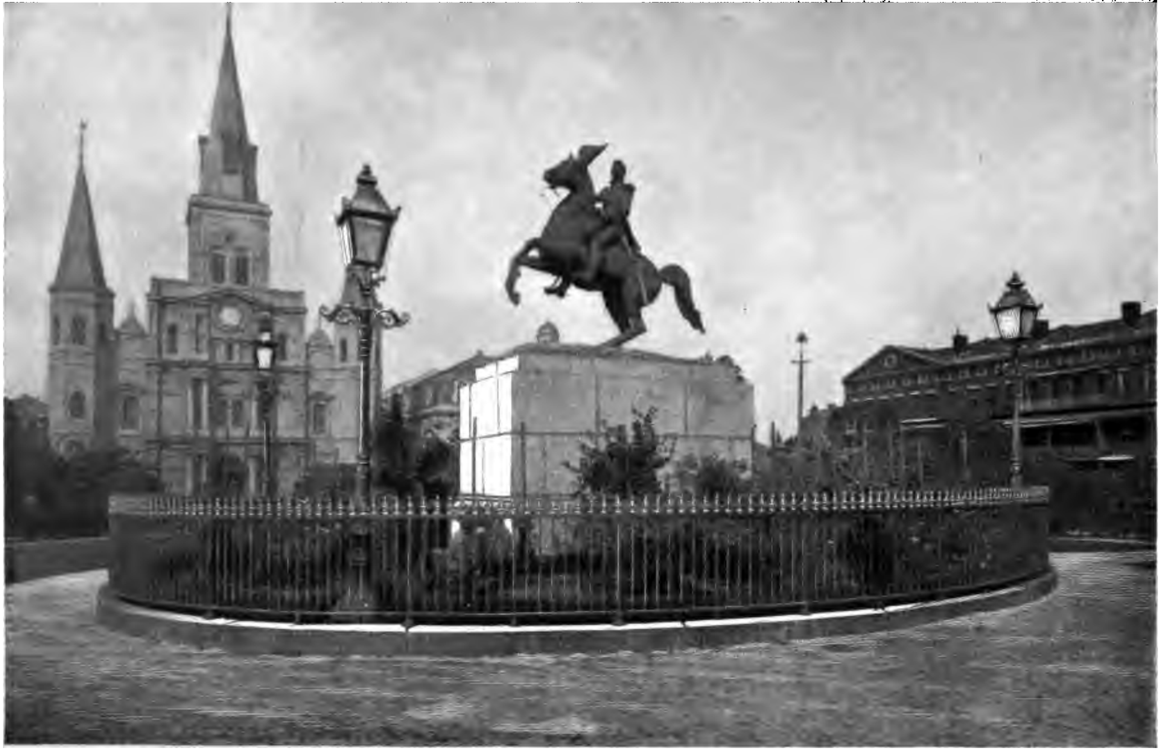
On hearing a comely colored matron accosted as Aunt Charlotte, I asked her if she knew of the grotto, on the venture that it derived its name from her.

"Law, yes, chile!" said she; "that grotto's named for me. My poor dead husband found it and gave it my name. I reckon one of my boys can take you to it."

Her reckoning was not amiss. I was taken to it; and there I found what seemed to be fringes of the night-blooming cereus, clumps of lilies, spikes of tuberoses, drooping fuchsias, wax-leaved magnolias, every gem of the greenhouse and parterre; only the snowy plumes were all of spotless alabaster.

H. C. Hovey.

ON THE GULF.



The Cathedral and Jackson Monument.

New Orleans.

So mighty is the Mississippi, curving in a crescent as it sweeps by the city, and so vast are the bayous and lakes about her, that one would not easily suppose New Orleans had raised her splendor more than a hundred miles from the sea. There is something romantic and marvellous in her seat among so many waters and below the level of the river that pushes itself through innumerable mouths far out into the Gulf below her.

The town is protected by an embankment called a levee, generally used as a wharf by throngs of steamers and packets. This levee rises several feet in a gradual slope, so that no flood in the river will overflow the streets; on one side of the city the levee skirts the lake, and is a protection against the backwater of storms.

These embankments are in use all along the course of the Father of Waters, and when by any caprice of the river, by undermining because of bad building, or in any other way, a break in them occurs, miles and miles of country are swept under the current to the destruction of everything but the virgin soil, and sometimes even of that.

It is one of these occurrences that suggested to Mr. Cable the incidents of a powerful story. The unnoticed river, eating its slow way through the levee, suddenly at night bursts all bounds, and the land, and the house, with its lights and harp-players and dancers, go down and disappear in the horrible darkness.

The water-works of the city have now brought the Mississippi into the hydrants, and the gutters are flushed by the great river that, when kept in close bonds, does good service.

The city occupies the whole parish of Orleans, which contains about a hundred and fifty square miles, but only about forty of them are used. One mile of it was originally laid out by De la Tour, with the streets crossing at right angles, the cathedral at the front centre; but where the town has extended it has done so irregularly. There are beautiful parks and squares, canals for commerce and for drainage, hospitals and hotels, a mint and a custom-house, a city hall of white marble, a host of markets and public schools. Canal Street, which is a splendid avenue a hundred and fifty feet wide, divides the old town from the new.

The old town is chiefly the ancient French settlement, where the streets are often not forty feet in width, with quaint names, like Rue Royale, Rampart, Esplanade, with quaint signs, and with quainter people frequenting them. Because of the unusual in face and speech, and because of its historical character, replete with legend, this is the most interesting portion of the city.

In the more modern part of the city are broad, well-shaded streets and spacious houses in the midst of gardens, where the sward is greener than emerald, and one looks through the open palings upon clusters of the deep pink crape-myrtle, upon palm-ferns, and upon open galleries peopled by lovely ladies in lawns and laces. Beautiful magnolias lift their dark towers of shining greenery, and here and there an old palm-tree invites the eye up its thirty or forty feet of scaly bark, to its tufted foliage where high in the blue air it drops its old brown boughs and puts forth its bright new plumes.

It makes a child of New England feel far away from home, when looking at the lovely marvel of a palm-tree; yet, nevertheless, if once inside those pleasant places, one is made to feel very much at home. One seems to be in a land of enchantment, when looking out at one of these gardens in full bloom just as a shower has fallen, and a norther comes up to freeze every drop of the rain, and sheathed in the thin film of ice that has formed too quickly to wither them, every flower sparkles in the returning sunshine with ruby and sapphire and topaz petals.

There are several features of New Orleans that are to be seen in few other cities. The stranger soon notices the sewage in the open gutters, that one has to step over at every crossing, and that one meets a little way out of the more populous portion of the place in a canal ten feet wide.

It would seem as if the Mississippi hydrants might do their work a little more effectually in flushing these gutters; but perhaps it takes even a stronger power than the mighty river to clean them, as after they have run their slow length to their receptacle, the contents have to be pumped up, and discharged into deep water.

In the Old Cemetery.

Although water is brought into town, nearly every house has its cistern for rain-water besides. The cisterns are built above ground, lest any of the moisture of the damp soil should percolate through their sides; they are circular, and hooped like a gigantic hogshead, and sometimes reach to the top of the third story. One gets interested in the sight, and feels that only those in this climate have wealth and luxury, who have broad galleries and enormous cisterns. The water is cooled for drinking by ice, which is manufactured through chemical means, of a finer grain and at a rather cheaper rate than nature can supply it, taking freight into consideration.

It is this wet soil which makes it impossible to dig a cellar or a grave in New Orleans. All the dead are buried above ground in little ovens, as one might call the mounds, or in stately tombs. This necessity has brought about a pleasing custom of making the cemeteries beautiful.

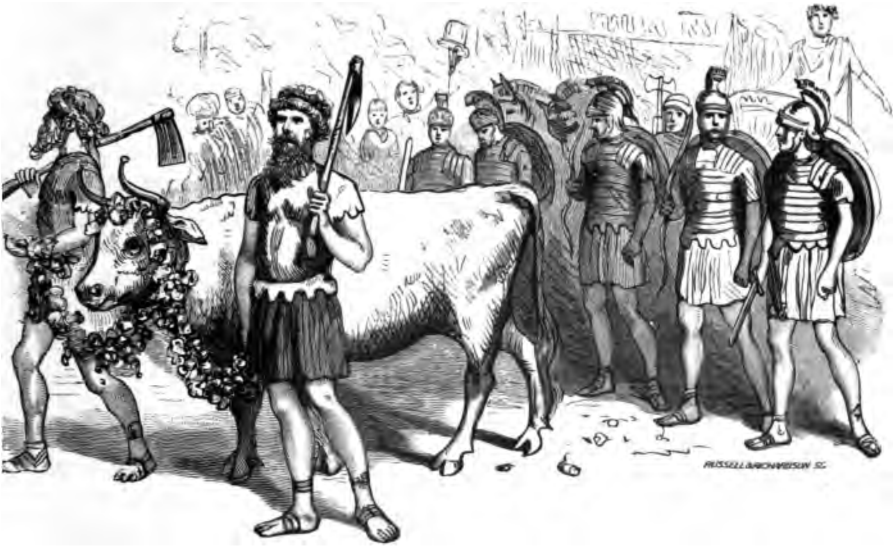
Although there is something disagreeable to unused eyes and sensibilities in the little marble temples, whose glass doors allow one to see the caskets on their shelves, with their wreaths of immortelles, or of fresh flowers, yet with the customary renovation just before each All Saints' Day, the alleys and fountains, the temples and groups of sculpture, the willows and the live-oaks draped in funereal mosses, the magnolias and palms and flowers, make these cemeteries places of great beauty.

The whole region of New Orleans is remarkably picturesque. In the city, even where the houses are in blocks and rows, they are covered with lace-like fronts of iron balconies, and many of the dwellings are of a peculiar architecture, pretty, low, masked in vines and surrounded by small gardens.

There is a charming drive to Lake Pontchartrain, on the Shell Road, and one of the favorite diversions is to go out on a hot night, either by rail or road, to the old Spanish fort or to the restaurants at the West End, and order a supper of pompanos and soft-shell crabs and other delicacies, served on the veranda, while the cool, delicious breeze blows off the lake, and sails steal slowly about far out on the horizon's edge of the purple waters. Nothing is more weird and captivating to the fancy than the lighthouses down among these lonely waters.

By whatever way you enter New Orleans, you can gather an idea of the amount of wealth of which it is and is to be the centre; whether you see it coming down the river in barges and three-decker steamboats, or whether on the huge freight steamers that wind in the other direction along the rich regions of the southern shore.

Perhaps no richer regions exist in the world than these, the great plantations of the Teche and of St. Mary's Parish. Immense plains, teeming with rice, sugar and cotton, and broken by no other fence than at long intervals a blossoming hedge or else a wilder reach of cypress-swamps, stretch their dazzling tender green into the distant sky. There are lofty trees gay with a wild luxuriance of vine and gorgeous bloom, and flashing pools of water on whose edges one often sees a basking alligator, a beautiful blue heron, or a rosy spoon-bill, while here and there a narrow waterway opens, down which float the cypress ties, cut far back in the forest, and fastened together by chains and ropes.


RUSSELL & RICHARDSON SC.

The Carnival Procession.

The people of New Orleans are, perhaps, as cosmopolitan as any in the world, if not more so. Among them are many Roman Catholics, and that may be the reason why certain festivals of the Carnival season are kept by them with great display, especially that of the Mardi gras, which the French citizens began to celebrate about the year 1827.

It is a legal holiday, under the control of King Carnival, known as Rex, who appears suddenly upon the streets, attended by his special guard and escorted by footmen and mounted knights, in a procession of surpassing beauty. Group after group arranged with superb effect, and regardless of expense, move slowly along in a dazzle of splendor.

This group, perhaps, illustrates Egypt,—pyramid, palm-tree, Pharaoh, with Cleopatra in her barge, with the fellah of the Nile and the Sphinx watching these various eras of her children; and that one is chivalry, with the knights and ladies, falcons and mediæval accessories; another is music, it may be, or it is the event of some especial epoch, such as the meeting of the Kings in the Field of the Cloth of Gold, or the walk of Hypatia, where Jew and Greek and Goth and early Christian met on the same spot.

The idea of each group is a central one, and it is carried out with spirit. Jewels and velvets and cloth of gold are but a part of the sumptuous array where everything is on a princely scale. The affair has been of so long date that even the children know the characters, and can call them by name.

A ball, at which Rex chooses his queen, takes place after a series of matchless tableaux. The whole arrangement is made as superbly scenic and processional as possible. One prefers not to see in this anything like an advertisement to bring the money of strangers into the place, but if it were so, it is certain the strangers get their money's worth.

On the whole, few places have more to offer strangers than New Orleans, and its climate is one of balm, the frost seldom amounting to discomfort, and the heat always tempered by a Gulf breeze.

HARRIET PRESCOTT SPOFFORD.

Galveston.

The Bay of Galveston is the best harbor in the whole circle of the shores of the Gulf. It is eighty miles long, and in some places fifty miles wide, and has an anchorage of five fathoms protected by the thirty miles of the island that gives it its name, its existence and its shelter.

The advantages of such a harbor have been fully recognized in commerce, as is evident in the many lines of steamers plying between Galveston and domestic ports as well as Mexico, Central America, and the great commercial cities of Europe.

For the management of so much shipping about two miles of water-front, comprising four miles of wharfage, are in service, and more than double this amount of deep-water frontage is available when needed.

The island is one of those masses of sand thrown up by the sea in many places along our Southern coast. These meet the bars of rivers, and are kept from reaching the mainland by the volume of water which the rivers pour down in such quantity as to push off the encroaching particles while they deposit their own, and hold the battle between themselves and the sea in an even scale.

The city, which is located on the extreme eastern end of the island, at first glance from the Gulf side, seems to sit upon the sea with a soft, silvery veil about it, so low in the water that it could well be fancied one of those mirages that are so frequent over these waters.

Galveston was named for the Count of Galvez, to whom New Spain, as all that part of the continent was once called, owed many reforms in its government. It was a daring idea of the first settlers to plant their fortunes upon this long and narrow strip of the salt sea-sand more than two miles from the mainland.

But time has proved the wisdom of their venture; and from beginning with part of an old wreck half imbedded in the sand, for a hotel, and with nothing but a wild beach undergrowth on the island, there has grown up a large and populous city, with a number of hotels equal to any in the land, with great commercial houses and dwellings charming to a degree, with gardens of flowers and streets that are so shadowed by blossoming and fragrant trees that they might be the walks of an Eden.

Loading Cotton.

There are broad and long avenues lined with the China umbrella-tree, whose masses of darkest green foliage are forever tossing like thick plumes in the sea-wind, whose shade is almost black, and whose clusters of pale purple flowers make the air heavy with sweet odors. Thriving luxuriantly on perpetual sunshine, and all the water they want to drink a foot below the surface, are oleanders the size of apple-trees. Some are loaded with bunches of blossoms in deepest pink, and others in purest white, all shedding abroad a delicate and delightful vanilla-like perfume.

Over the high walls of gardens, with their pomegranates and figs, rise great orange-trees loaded with bloom and fruit, perhaps as beautiful objects as the round globe offers; and within those gardens half the flowers that people of the North pay great prices for at the greenhouses, drop into the hands for the taking. Of course all this has not come to pass without great trouble and pains and labor, in the perpetual enriching of the soil, and a constant pride in its production.

There is not a city on our shores that makes a more delightful summer residence than Galveston. The heat is only a soft and delicious warmth, tempered by the Gulf breeze with which the trade-winds continually blow over the island. Everybody dresses to meet it, in white linen and sheer muslins in their season, and after a siesta there is a constant round of social gaieties in which most of the ladies wear Paris costumes in the last whim of fashion and expense, notwithstanding the fact that the not unhealthy dampness spots silks and kid gloves, as if they were on a sea-voyage.

Wealth has made all luxuries here comparatively easy of attainment; for the cotton-trade has been the means of centering great resources in Galveston. This wealth is evident in the spacious mansions and the buildings on Tremont Street and on the Strand and elsewhere, in the opera-house, churches, race-course, cemeteries, street-railways, gasometers and daily papers.

Not the least delightful custom of the pleasant life of the place is the sunset driving upon the beach. This beach is one of the finest in the world, being thirty miles of hard sand where the horses' hoofs will not leave a print, and where the waters of the Gulf of Mexico, with all the vivid splendor of its color, swing to shore in a long roller.

Within five minutes by electric car from the principal parts of the city one may find at the beach the finest of hotels and the most perfect accommodations for bathing. Whether sporting in the waves, resting on the hotel lawn, or dancing in the parlor, one finds every pleasure appropriate to a charming watering-place.

There are some citizens who have cottages on the beach, in which to pass the night when they want to be cooler than in town, but generally the nights are cool enough for sleepers to need a blanket over them anywhere on the island.

Bath-Houses, Galveston Beach.

One cannot leave Galveston without admiring the enterprise of bringing to the city an abundant supply of pure water, which is piped under the bay from artesian wells on the main land.

Another object of interest is the steel bridge, two and a seventh miles long, connecting the city with the mainland. A drive over this bridge and on the shell road, reaching far back into the country, gives an experience to be remembered with pleasure, long after one has left this charming and progressive city of the South.

HARRIET PRESCOTT SPOFFORD.

A Southern Farm.

A Northern man who has never been South in summer, naturally fears the heat above all other discomforts when he finds he must spend at least two weeks in New Orleans in the latter half of July.

Such were my feelings as the train bore me for the first time on a summer's day into the Crescent City. I had no idea whatever of the possibilities of the pleasant surprise awaiting me.

My business required only short and decisive interviews with several firms, and a delay of some days for the completion of our transactions. I dreaded the interval, but it proved a fortnight of pleasures.

On the second day in the city, after I had completed my preliminary business, I was so fortunate as to meet my old professor at the door of the hotel; and here my story of surprises begins.

After the first greetings I mentioned a probable fortnight of suffering in the heated city, when the professor most cordially urged me to go home with him and enjoy the cool breezes at his farm. The idea of a New Orleans farm puzzled me, because I knew something of the city and its surroundings.

In answer to my questions the professor said, with a twinkle of his eye, "It is on the first bit of dry ground east of New Orleans, a little ride over the line into Mississippi."

That same evening I was seated with the professor on his veranda, enjoying paradise. The moonlight gave magic touches of color and tint to flower, shrub and vine, to tropical plants, trees and fruits, to the emerald lawn, and in front of all to the peaceful waters of the Gulf, whence came the most delicious zephyrs, which every night of my stay lulled me into the slumbers of fairy-land.

I was amazed. I was enchanted. Aladdin had transformed the surrounding region with the magic of his power; and for nearly two weeks the professor's story of his farming was more charming to me than the Arabian Nights' Entertainments.

For many years wealthy New Orleans families have enjoyed the comforts of summer residences along the shore of the Gulf, particularly in the vicinity of the beautiful city of Bay St. Louis. The soft summer breezes from the Gulf drive away the languor natural to a hot city, and every night is perfect for comfortable sleep. Such a climate and such conditions make possible the most charming society in the world. But the professor lived too far from society to be drawn often into the pleasures of their frequent evening entertainments.

The Professor's Farmhouse.

It seems that an unfortunate "carpet-bagger," feeling that his presence was not cordially welcomed in the aristocratic New Orleans families, bought a small plantation at some distance from the cottagers, and proceeded to transform it into a model farm and a beautiful summer residence. When the collapse of carpet-bag rule came, his isolated place had few attractions for society, and our professor bought it at a very low price.

To the lavish lawn and house decorations the professor added only the touches of his own artistic taste. To the tilling of the farm he added the practical supervision of a skilled agriculturist who is also a master of horticulture.

A heavy mortgage compelled the professor to plan methods to secure the best and surest profits, which he laughingly says have made him a successful truck farmer; for while waiting for his first crop of corn and cotton he found close at hand an immediate market for all the vegetables and small fruits he could raise.

Every early vegetable is forced into readiness for market, and all through the year different plantings give the choicest of vegetables in season and out of season. In May, August or November the same spring vegetables are found on the tables of many a New Orleans family.

Moreover, the professor delights in every variety of berries, fruits and nuts that will grow in that region. His large eggshell pecans are all bought in advance by a famous confectioner. He boasts of a few choice orange-trees and other sensitive tropical plants, which his men protect on the occasional frosty night of winter by canvas tents. These he calls his only luxuries.

His best market is in summer at the houses of his neighbors, the wealthy families from the city. His mule-wagons make daily trips all the way to Bay St. Louis. The year I visited him he sold to his neighbors fifty thousand pears in small daily lots at an average price of one cent each, while his peaches, plums, apricots, figs and grapes added a pretty sum to the sales.

In the months when the professor is with his classes, and the cottagers have returned to their city residences, the farm products are sent by contract to certain city markets where the freshest and choicest eatables are to be found. Even in sending goods to the city market the professor shows the economy of a thoughtful system. Every shipment is made in boxes or crates that can be returned in nests, that is, one box fits just inside the next larger. All the little cheap berry-baskets are bought in flat bulk from the factory and, like all crates and boxes, are made in the carpenter's shop on the farm.

The professor's herd of cows contains only the choice breeds. All the milk he can produce in summer finds a quick sale in the neighborhood. All the butter he can sell in winter finds eager purchasers at the city market. He feeds to his cows many succulent vegetables and fruits which would be considered fine in the city, for he allows only the choicest and best of every product to go to market. Moreover, he will not allow any inferior varieties of plant or fruit tree to grow on his farm. Yet there always remains an abundance fit only for food to his large herd of swine.

A Student's Window.

One more branch of farming completes the professor's outfit. He has large flocks of hens, turkeys, ducks and geese, kept in their proper pens and yards, a few peacocks, to which the liberty of the lawns is given for ornament, and a dovecote of pure white pigeons.

Best of all, the professor has made his farm an educational institution. Every department is conducted with the best skill that agricultural colleges and practical training have taught. There is also some training in wood and iron work, for all the carpentry and blacksmithing necessary to the estate is done under the direction of a skilled mechanic.

Most of the work is done by colored students from a large institution of learning in the city. They thus earn money to pay their tuition, and they learn the best methods of making a home, which many carry into practice after graduation.

The young women are housekeepers and cooks, they have full charge of the dairy, they pick the berries and small fruits, and prepare all these for market by careful packing in small boxes or baskets. The young men do all the heavy work, from plowing and seeding to gathering corn and picking cotton. By a system of right-angle planting nearly all the cultivation is done by mules with plow, harrow or horse-hoe, and severe manual labor is reduced to the minimum.

The young men's quarters are situated convenient for bathing, for in that respect the professor is a tyrant. He insists that in every department there shall be cleanliness if not godliness. As a token of appreciation, and help to intelligence, he gives them a season of rest in the heat of the day, and provides a reading-room which contains the daily *Picayune* and several weekly papers, with religious and literary publications, including the *Youth's Companion.*

These things I learned as I talked with the professor on his veranda, watching the lights twinkle on the waters of the Gulf, as I walked with him over his enchanting lawn, and on horseback as we rode through the paths of his fields and pastures.

All this is the professor's play and recreation. His real work is molding the minds of his many students, and equipping souls with intelligence that develops into the life eternal.

MAX OWEN.

Our Winter Home.

A Winter Home on the Gulf.

After a journey of thirty-six hours we find ourselves in a new world as regards climate and the beauty of the vegetable productions of the country. The roads are like plowed sand, the woods are yellow with sage-grass and bristling with pines that look, in the distance, with their straight, bare trunks, not unlike the palm of the tropics. A cloudless blue stretches above the smiling landscape, a brisk, clear wind stirs the orange leaves, and the sun smiles cheerily over all.

The home life on the Gulf is delightful. The children play on the wide verandas; there the ladies of the house gather with their wicker chairs and work-baskets, sometimes wheeling the sewing-machine out under the leafy shade, and so dispose themselves for their daily tasks.

Beyond is the garden, with its lovely walks. Near us stands a bushel basket heaped with enormous oranges, not the products of the trees that stand in groups all over the yard, for their yield is over, but grown about two miles from here; splendid specimens of the fruit, for which one has to pay dearly in Northern climes.

Breakfast is over, the rooms are cleaned and darkened, and we look out from our parlor on the garden in front of the house. It comprises about an acre, and is laid out in evergreen trees, among which the live-oak is conspicuous. These trees grow to an immense size, and cast a shadow from fifty to a hundred feet in circumference.

Could you see, as I do, a group of merry children in their white frocks and blue ribbons, frolicking under the broad-spreading branches, you would find it difficult to imagine that there is winter anywhere in the world. The flower-beds are finished in circles and heart shapes, and abound in a great variety of lovely flowering shrubs.

One of these is the century plant, whose bristling clumps, rich with the life of over a hundred years, stand up like giants with their myriad spike-like leaves. Not far from them are immense cacti with pear-shaped leaves, in the midst of which, before many weeks, will come bursting forth magnificent crimson flowers, to challenge the admiration of the looker-on, and intoxicate the senses with their delicious perfume.

Above our heads the yellow jasmine shakes down its flowers of starry gold, and these, too, fill all the morning air with fragrance. The oleanders are not yet in bloom, but their graceful forms and thick, bright leaves add much to the beauty of the garden. Loveliest of all the flowers is the cape jasmine. Imagine a bush, or small tree, every leaf glistening as if varnished, blooming all over with great white flowers as finished and as beautiful as the white camellia, and of the most exquisite perfume.

Over the porch hangs the crimson honeysuckle in clusters, and at intervals lines of orange-trees form a vista that makes a scene of enchantment. Nothing is more lovely than the orange-tree in bloom, except the magnolia. Northern gardens cherish the puniest specimens, but here stands a magnolia sixty feet high, every leaf as polished as if coated with wax.

Though there are no flowers observable, yet the time of bloom is very near, and the tree is bursting with buds. In a few weeks its subtle, delicious perfume will invade the house and make the air as odorous as if invisible lily-buds were floating by on every breeze, or angels bringing the spices of the gardens of paradise.

Here, there and everywhere the roses stand, great, strong-limbed bushes with vigorous, beautiful buds, ready to put on their rich garments. Here the rose has no enemies to encounter. The worm at the root is never known, and no colonies of green, swarming pests vex the soul of the garden-lover. Everywhere roses grow side by side with monster beds of geranium in all its variety of color, from flaming crimson to pearly white, while between are beds of verbena, callas, pomegranates and crape myrtle.

Outside of the pretty, ornamental plants are stout, scrubby fig-trees, all starting out for the season. Now to have your own figs for winter use is no mean experience. The people here know how to put them up, and they make a delicious preserve.

Let us step beyond the fence enclosing this paradise, to the lot beyond where stand the peach-trees, cloudy with their pink blooms. Here are the forcing beds, thick with cucumber-vines and young tomato-plants. Farther on are green peas, almost ready for picking for the table.

Yonder are cabbages of full growth and every variety, radishes, young beets, sweet potatoes and celery. These are planted between rows of sturdy orange-trees, each of which bears four or five thousand oranges a season. Perhaps the most beautiful sight of all is an orange-grove of from ten to twenty acres, loaded with fruit.

It is pleasing to meet polished and cultivated men and women where expectation had pictured a meagre civilization. It is no unusual thing to welcome an assemblage of neighbors from a radius of ten to fifteen miles around.

At the house where we are staying forty carriages brought their loads of human life. Every family had prepared a basket of delicacies, so that the supper-table was loaded with good things. In that gathering were representatives of fifteen different states, and all of them people of refinement. There were recitations, readings, music of violin, organ and guitar, and no mean music at that. Everybody brought his quota of information, and dancing closed the order of the evening.

It was a picturesque sight to see them taking their departure at midnight: the teams standing about the house in the vivid moonlight; here and there father and daughter on splendid horses, the young men in the saddle riding off, after making their adieus, with many a laugh and cheer down the long orange-bordered avenue. It was like a scene out of a novel, and one never to be forgotten.

M. A. DENISON.

Lights of the Florida Reefs.

No more important or interesting chain of lights exists on any part of the American coast than those which flash their brilliant rays over the two hundred miles of coral reefs bounding the southern extremity of Florida.

The terrible Florida reef, with its bewildering maze of shoals, tortuous channels, fierce currents and coral heads lifted almost to the surface, is an ever present menace to the mariners of those waters. Since the date of its discovery it has probably been the cause of more disasters than any other region of similar extent in the world.

Proud British frigates and treasure-laden Spanish galleons, merchant ships of every nation, coasting schooners and fishing craft have been enticed into its siren-like embrace, and paid tribute to it with their lives.

A startling record is that of the Spanish treasure-fleet of thirteen galleons which sailed from Vera Cruz in 1737, and yielded twelve of its number to the demands of this all-devouring reef.

The seaward face of the reef drops abruptly into the fathomless depths of the Gulf Stream. Inside of its coral banks is a broad channel of smooth water, beyond which lies a parallel chain of palm-covered keys, or islands, of great fertility and beauty.

For upward of three centuries these reefs, channels and low-lying keys afforded a very paradise for pirates, buccaneers and wreckers. In their swift, light-draught schooners these freebooters threaded the shallow passages with impunity, and defied capture. They had innumerable retreats among the keys, where they lay concealed beyond the chance of discovery.

It is only in the present century that our government has found time to hunt out these freebooters, and penetrate their fastnesses with small but powerfully armed vessels of as light draught as their own; and it is within fifty years that the first reef light of the present splendid system was erected.

Before that there were two brick lighthouses, one at Cape Florida, on the coast, inside the northern extremity of the reef, and the other at Key West, though a fourth-order light was shown above a bastion of Fort Jefferson, at the Tortugas, as early as 1825.

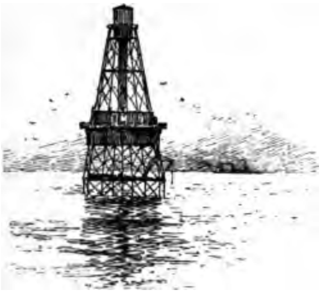
To erect a number of masonry towers, the material for which must be transported over a thousand miles, seemed too great a task to be undertaken. Thus it was not until after the introduction of iron screw piles for foundations that it was deemed feasible to light the entire reef.

In 1852 an iron tower one hundred and six feet high, upheld by a pyramidal framework of iron trusses, and resting on a foundation of iron piles screwed into the coral rock, was erected above Carysfort reef, where it rises to within two feet of the surface. The building of this tower was accompanied by the bitter curses of the wreckers; and when the first beams of its powerful light flashed far and wide over those dreaded waters, they realized that their occupation was gone.

Sand Key light was built the following year, Sombrero in 1857, and the light on Loggerhead Key, the most western of the Tortugas, in 1858. This last is the only brick structure on the reef. Then the Civil War interfered, and the next reef light, known as Alligator, was not erected until 1873. In 1878 the old Cape Florida light

Sombrero Light.

was discontinued in favor of the splendid new one set on Fowey Rocks, seven miles out at sea, on the northern extremity of the reef. Both this light and Carysfort, which is the next one to it, preserve the names of two British frigates cast away at these points.


American Shoal Light.

The Fowey Rocks light is one of the most perfect structures of its kind on our coast. It was first set up in Fairmount Park, at Philadelphia, during the Centennial Exhibition, as a typical American lighthouse.

The old tower on Cape Florida, which witnessed many a stirring incident during the palmy days of piracy on that coast, during the two Indian wars that raged about it, and during that of the rebellion, became the headquarters of the Biscayne Bay Yacht Club, the most southerly organization of its kind in the United States. In 1880 the American Shoal light, twenty miles east of Sand Key, was erected, and in 1886 the long chain of flashing beacons was made complete by the building of a lighthouse on Rebecca Shoal, eighteen miles to the eastward of the Tortugas.

These structures are similar in character, and rest on foundations of iron piling. With the exception of Sand Key light, which occupies a tiny islet of sand and shells, the most southerly bit of territory under the stars and stripes, they all stand in the water.

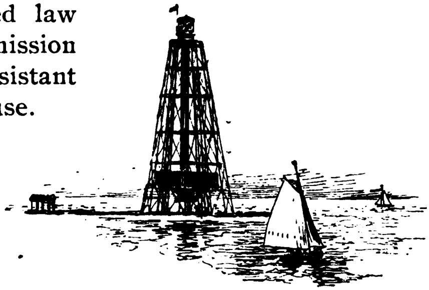
In each the lowest platform, about ten feet above the surface, is used for the storing of boats and fuel. Ten feet higher up is another platform surrounded by a railing. On this rests a huge iron cylinder, resembling the turret of a monitor, which is divided into rooms. It is the house in which the keepers live, and where all their provisions, as well as a year's supply of oil for the light, are stored.

In some cases this house is of two stories, when it is very roomy and comfortable. From the centre of the dwelling rises a slender iron tower in which a spiral stairway leads up to the lantern, lifted from one hundred to one hundred and fifty feet above the water.

In these isolated reef structures, where the only sights are sky and water, with a low line of distant keys on one hand and the passing ships on the other, life is not so terrible as might be supposed. There are three keepers to each light, and one of them is nearly always off on vacation. Consequently the time of the others is fully occupied.

They must keep their lamp in order, and every bit of glass and bright metal about the lantern polished until it glistens. Their house must at all times be spotlessly clean, and as neat as the deck of a man-of-war. Its exterior must be kept painted, its boats must always be in order, and a daily record must be kept of all passing vessels. Then the keepers must cook, eat and sleep.

In spite of these manifold duties, they find time for reading and study. A presiding officer of the Florida Senate studied law and fitted himself for admission to the bar while acting as assistant keeper in a reef lighthouse. Several other young students of my acquaintance pursued the same course.


Sand Key Light.

A reef lighthouse is always well supplied with the latest novels, magazines and papers by New York steamers that pass close to it every day. A keeper puts out from the light in a small boat. The mate of an approaching steamer has already collected such papers, magazines and novels as the passengers are willing to spare, done them up in a bundle, and tied them to a billet of wood.

As the steamer passes the waiting boat, the package is tossed overboard. The lighthouse man waves his thanks, captures the dripping prize, and carries it back to his iron dwelling, where its contents are sorted and dried.

Often the steamer slows up long enough for him to exchange a thirty-pound kingfish or a fine string of Spanish mackerel with the steward for a piece of Northern beef or mutton, and perhaps a cake of ice. The light-keepers are far better supplied with news, literature, fresh meat and other luxuries than their shore neighbors of the keys.

The reef lights are surrounded by some of the most wonderful marine gardens in the world. The water above which they stand is perfectly clear. From the bottom rise delicate coral forms, sponges, sea-fans and feathers of vivid colors, and forests of exquisite algæ. Amid these dart thousands of strange fish, brilliant of hue and curiously marked. Here the lighthouse man fishes or gathers curios, and whiles away many an hour of the bright tropic days.

He cannot make a home of his lighthouse by having his family with him, for a rule of the department forbids any woman to spend a night in one of these reef beacons; but he may visit his wife once a month if he chooses, and spend nearly a third of his time at home.

Thus, on the whole, the life of a reef lightkeeper is not an unhappy one, and there are always more applicants for the positions than there are vacancies to be filled.

KIRK MUNROE.

Florida Wreckers.

Curiously enough, the term wreckers, formerly applied to those who sought to wreck ships for the sake of plunder, has come to signify those who save ships. In Florida the wrecker of to-day is one who strives to rescue ships from destruction, who often perils his own life for his fellows, and whose legitimate business is the recovery of cargoes that but for his efforts would be irredeemably lost.

Of the entire American coast, no portion has so many wrecks in a year as the great reef stretching for two hundred miles from Cape Florida to the Dry Tortugas. Consequently nowhere else does the trade of wrecking so flourish. But the lighting of the reef from end to end has seriously affected the prosperity of the trade, and the lawful wrecker of to-day obtains insufficient means for the prodigality that marked his lawless predecessor of fifty years ago.

The city of Key West owed its foundation and its very existence up to the time of the Civil War to the gains of wrecking. The same occupation built up a riotous rival town on a key half-way up the reef. To-day this island is as lonely and bare of any traces of its wrecker occupants as Key West might be did it not occupy a commanding position on one of the great ocean highways.

In spite of being lighted, buoyed and carefully charted, this vast web of reefs still destroys many a helpless vessel, and wrecking is still an occupation in which every dweller along its length is intensely interested.

Between the Bahamas and the Florida coast the Gulf Stream rushes northward with an average velocity of four miles an hour. To escape the strength of this current, the weekly fleets of steamers from Northern and foreign ports hug the coast as closely as they dare. Now and then one of them brings up with a grinding crash on some outlying shoal or coral head that had not been allowed for in the captain's calculations; or some becalmed sailing-vessel is insidiously drawn toward the reef by the treacherous currents.

When there are no wrecks in sight, there is always plenty of wrecked material coming ashore, especially on the strip of beach extending northward for thirty or forty miles from Cape Florida. Nearly everything which finds its way into the water along the whole line of the reef is borne opposite to this point by the current of the Gulf Stream, and then driven ashore by the northeast trade-winds sweeping around the upper end of the Bahama Islands.

Some winters ago an old, unseaworthy Spanish barque, deeply laden with wines and bound for Havana, had nearly reached her destination, and was within sight of Morro Castle, when she was driven out to sea by an offshore gale, and foundered near the Tortugas. A month later her entire cargo of great pipes of red wine and casks of sherry was cast ashore on the beach just north of Cape Florida, two hundred miles from the scene of the wreck.

The first person to discover this treasure was a Frenchman who visited the beach in search of wrecked lumber with which to build a house. His one complaint against that wild section of this country had been that in it he could not obtain the cheap wines of his native land. Now to find what he had most longed for in such quantities as he had never dreamed of, and to be had for the taking, seemed to him little short of miraculous.

He returned to the settlement across the bay in a state of the wildest excitement, bearing his wonderful news. At that time there were not fifty white men to a hundred miles of that coast, and they were widely scattered. But before nightfall they were all on the beach, rolling the oaken pipes and casks up from the breakers to places of safety.

Every man put his private mark, which was respected by all the others, on the packages that he rescued from the breakers, or claimed by priority of discovery half-buried in the sand. All were jubilant over the wealth they were to acquire by the sale of this gift of the sea. One man, aided by his two sons, secured over five thousand gallons of wine, that he was confident would yield him one dollar per gallon.

During the ensuing week he conceived numerous brilliant schemes for the investment of his wealth. Suddenly they were all rudely dispelled by a mandate from the Collector at Key West, to the effect that, since the wine had landed without paying duty, none of it could be sold.

Bales of Cotton from a Wreck.

Then ensued such a scene of riotous waste as I never beheld before or since. In their rage against this decision, men beat in the heads of the pipes and casks, until the thirsty sands were deluged by torrents of Spanish wine. Some was saved in bottles and jugs; but these were so scarce that probably not over a hundred gallons was rescued in this way.

Cotton is much more satisfactory; for even water-soaked and sanded cotton is worth fifteen dollars per bale. Therefore, whenever cotton is reported as being on the beach, the wildest kind of a race ensues.

Men hurry across the bay in any kind of a craft that will float, and then on foot up the beach. Each man marks the bales that he reaches first as his property, by leaving on them bits of his personal belongings—a hat, a handkerchief, a knife, even a shirt, anything will do.

A bit of wood with the claimant's name scrawled on it is sufficient to make good his claim, and cause it to be respected by those who come after him.

If all the bales were already on the beach the swiftest runners would secure more than their share of the spoils; but most of the bales are still in the breakers, from which they must be dragged and placed beyond the reach of high water.

Squared logs of mahogany and Spanish cedar are every-day finds on this beach, and so much yellow pine timber comes ashore that every house in the adjacent settlement is framed of it. On the piazzas of these houses may be seen steamer chairs that have come from the beach.

A baby's cradle was picked up last winter by a wrecker, in whose family it was a prime necessity just then; and nearly every man in the settlement owns a derelict boat. So the list of curious and useful things yielded by that kindly beach might be continued indefinitely.

Every man on the reef who owns a boat of five tons' burden or upwards can become a wrecker by paying a yearly fee of two dollars, and obtaining a license from the United States Admiralty Court in Key West; and there are very few who neglect to avail themselves of this privilege.

With this license in his pocket the wrecker is so keenly on the lookout for stranded or distressed vessels that a ship can hardly touch on any point of the reef before several small schooners are seen hurrying toward her from the low-lying keys that form a continuous chain behind it.

If the captain of the stranded vessel refuses assistance, the wreckers must keep off, and no one from them is allowed on board. Then they anchor and await developments.

When the captain has exhausted his own resources and asks for aid, the first licensed wrecker to set foot on the vessel's deck becomes wreck-master, and takes entire charge of the operations of lightening the ship, running kedges, and either getting her off or saving the cargo.

Any agreement entered into between him and the captain as to the amount of salvage to be paid is equally binding upon the wreckers and the ship's owners.

If the vessel is given up and only the cargo is saved, this must be taken to Key West and sold at public auction by a United States marshal. Of the proceeds, half goes to the underwriters and half to the wreckers. The latter portion is divided equally between the wrecking boats and their crews. The amount allotted to each crew is divided into as many shares as there are men on board.

Running to the Wreck.

The prize most eagerly desired by the wreckers is a general cargo wreck, such as was afforded by the Ward line steamer *City of Alexandria* in the spring of 1890, when the beach was strewn for miles with provisions, clothing, pianos, sewing-machines, cases of imitation jewelry, and the thousand articles that comprise a freight of general merchandise.

On the other hand, a stranded steamer loaded with railroad iron, cement, or coal, that invariably floats as soon as she has thrown overboard her cargo, which as invariably sinks, is regarded as much worse than no wreck at all.

KIRK MUNROE.

The Florida Everglades.

Several attempts have been made to penetrate the Everglades. One party was sent out by the United States Government, but the difficulties in the way seemed insurmountable, and the explorers turned back, baffled, at the very beginning of the quest.

The New Orleans *Times-Democrat* in 1883 equipped a party, which, under the command of Major Archibald P. Williams, set out to explore the Everglades from a northern point to Whitewater Bay in the extreme south.

The explorers coasted the southern shore of Lake Okeechobee, in search of some outlet which would enable them to penetrate the dense jungle which borders the Everglades, and came to the mouth of a river running in the direction of the Everglades. The stream was one hundred yards wide and eight feet deep, the water as clear as crystal, and it had no perceptible current.

Hoping that this stream would take them some distance in the right direction, they entered it full of hope. The banks were beautiful, fringed with a dense tropical growth of trees and shrubs, which presented a wall of vivid green to the eye.

Two miles farther and the river narrowed. The walls of foliage almost met; large roots and low-lying branches forbade further movement in that stream. The line of alligators in their wake increased, and they found that the river ends in an impenetrable morass, or swamp.

The explorers returned to camp, and upon investigating the shore, found the mouths of eight rivers, all running south and in the right direction. To six of these rivers boats were assigned, with instructions to follow them as far as possible. When the report was brought into camp that night, one sufficed for all. The rivers ran only one or two miles, and then ended suddenly in swamps.

They decided upon one, the Rita River, as the point of departure. It took them within half a mile of the marsh which bordered the Everglades, and which they now decided they had to penetrate by some means or other.

The next day the hard work began and the compass was the only guide. The river had ended in a dense swamp of custard-apple. Axes and machetes were employed to cut away trees and vines, and in the afternoon of the fourth day the explorers found themselves in a marsh of grass and scrub-willows with five inches of water and fifteen feet of mud.

Discouragements of the Journey.

Climbing a tree to take observations, they saw south of them only an interminable marsh. There was no use discussing the situation. Orders were given for every man to go overboard, and overboard they went; and the canoes were propelled inch by inch through the mud.

The difficulty of getting through the grass was so great that Major Williams decided to fire it. The men suffered terribly from their legs and feet coming in contact with the roots of the wampee, which produces a burning and stinging sensation, as if the skin had been rubbed off, and red pepper rubbed in.

In pursuit of scientific information, Major Williams tasted the wampee. A thousand needles seemed pricking every nerve of his face for hours afterward, and the pain was maddening.

Two men who had been sent ahead to fire the grass, found one foot of water about two miles and a half from camp. This was encouraging news, as the progress by pushing the canoes through the mud was painful and wearisome in the extreme.

But the explorers found their route to the desired water was beset with new difficulties. They had to penetrate not only the marsh-grass, but a species of scrub-willow with small stems, but having roots as large as a man's leg, which reached several yards outward and lay a few inches below the surface of the water.

As the canoes were only a fifth of an inch thick, to snag a hole in one of them would mean its abandonment. The bateaux, with provisions, were unable to pass these obstructions, so the men went ahead with machetes to cut a way.

It was hard work, and the expedition advanced one day only three-quarters of a mile. In fact, on the fourth day from Lake Okeechobee, their progress had been so slow that they never lost sight of a large cypress-tree standing at the point of their departure from the lake.

The next morning a survey was taken from the high mast of the bateau. The prospect was one unlimited expanse of tall marsh-grass. They were unable to distinguish where the marsh-grass ended, and instead of ten miles of this grass, which they had anticipated, the field-glass showed a boundless extent of it.

By firing the grass in front they made slow headway, and the men were discouraged. Moccasin snakes slipped between their legs as they crawled through the mud; alligator snouts were at their backs, though they never were attacked by them; the wampee stung them, and clouds of mosquitoes added to the general miseries.

Alligators in the Waters of the Everglades.

After two weeks they saw two columns of smoke about ten miles to the southwest, which they understood were made by Indians. Their smokes were quickly answered to the front and westward by similar smokes.

Four days later they sighted the cypress timber which lines the western border of the Everglades. That day numerous flocks of ducks and curlews flew overhead, and they killed a supply of them. The next day they entered a basin, and found on its banks five feet square of dry ground, the first seen since leaving Lake Okeechobee. In three days more they reached the first island of the Everglades, and entered the grassy waters which surround it.

The island is about three miles in extent, and covered with wild fig and custard-apple-trees, with about twenty feet of dry ground. From the top of a high tree they could see hundreds of little islands, divided from each other by grassy waters. There the weary explorers camped, to mend their boats and rest from the fatigue of their toilsome journey.

The men suffered, too, from leech bites, which pests had fastened upon their legs and feet in the mud. After that the difficulties were over. There was plenty of water for the boats. The islands grew thicker as they went on, and the timber on them was larger. The signal smokes of the Indians were seen constantly, but none approached the expedition.

There is little dry land on any of the islands, and some are so infested with snakes that the men were not willing to risk a landing. The bottom of the basin of the Everglades is solid rock, and as the men moved on they found this rock beginning to crop out above the surface, and they were obliged to lift their canoes over the ledges.

At the end of one month they reached Shark's River, and soon found themselves in Whitewater Bay, thus coming out in the Gulf of Mexico, without diverging a mile east or west from their due southern course.

The result of the expedition proves that the Everglades is an irreclaimable marsh, and for ages to come will remain so. It cannot be drained, the rocky barrier which surrounds it offering almost insurmountable obstacles. No telegraph line can be established or kept up in it, and it is safe to predict that white men will not soon brave its perils.

M. B. WILLIAMS.

A Tree That Builds Islands.

Along the low, sandy shores of southern Florida there grows the small, round-headed mangrove, a tropical tree which may well be called a vegetable wonder. It has glossy oval leaves, and grows in shallow water along the shores of the sea, or on muddy or sandy banks that are submerged at every high tide.

Shortly after the blossoms open in July the seeds ripen, but do not fall off to germinate in the ground, as most seeds do. They sprout at once, but remain on the tree, and send out a long radicle or main root.

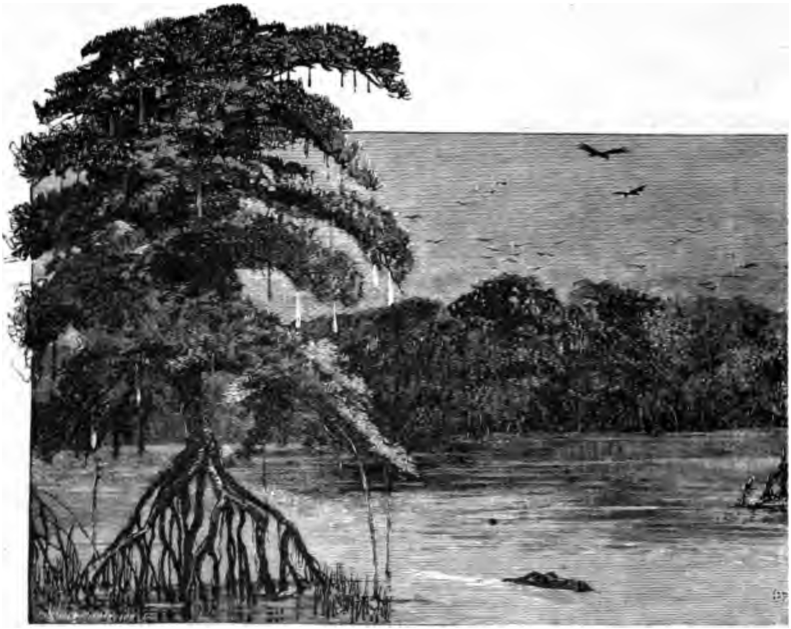
This curious root is about the color of a cigar, but is lighter on the point, or lower end. It sometimes attains a length of a foot or more, and the size of one's little finger, and when the trees are loaded with them, hanging thickly from every branch, the sight is strange indeed.

When they have received all the nourishment they need from the parent tree, they let go and drop, usually into the water, not, however, until they have formed a leaf-bud and often a pair of shining young leaves. Millions of these mangroves, for they are no longer seeds, but young trees, may be seen floating about the bays and on the open water along the shores of the southern half of the state.

Most plants would soon perish cruising about in this way in salt water, but, like an old sailor, no matter which way the wind blows or the tide drifts, they are perfectly at home on the sea. The light-colored end of the root being a little larger and heavier than the other, sinks below the surface, and in the course of the wanderings of our young tree it usually sends out several small rootlets, so that it is ready at once to begin the business of life as soon as it reaches a suitable place.

By and by it drifts into some partly sheltered bay, or in behind a low, sandy island, and its heavier end strikes the mud in the shallow water. The motion of the waves drills the point into the mud, the fibrous roots catch hold, and our wandering mangrove comes to anchor for life, and is as much at home as if it had always lived there.

After the plant is established, the stem grows up erect and rather slender for some distance, when it throws out, from a height of several feet above the water, an air-root, with a point almost exactly like that which the seed had when it was growing on the parent tree.



A Mangrove Swamp.

This new root arches over and out in an easy, graceful curve until it reaches the muddy bottom, where it throws out fibres and forms at once a strong buttress for the support of the tree against waves and storms. Other root branches are thrown out in the same way in different directions, each fastening itself in the mud and making a network of braces.

The tree now, with its low, dense, round head of evergreen foliage, mounted on its odd, stilted roots, bears some resemblance to a great spider, or granddaddy-long-legs. Nature seems to have created it in one of her humorous moods, as she has done some other things, on purpose to make people laugh.

Certainly one of these mangroves, seen for the first time, standing high up on its long bow-legs, is a comical sight. It has no trunk where it leaves the water, for it will be found that even in large trees the original stem has increased but little below, though high up above the sea it may become as large as a man's body.

From the branches other air-roots begin to drop down vertically, like those of the East Indian banian, and anchor as the rest have done, and the tree soon begins to spread. I have sometimes seen an acre of mangroves all tied together by a network of roots and branches, which had evidently sprung from a single seed.

Nothing could be better adapted to resist the swell of the sea, or heavy storms, as the roots occupy but little space, few of them being more than an inch in diameter; they are very strong and tough, and brace in every direction. The whole upper growth may bend over and sway about, or even be washed under during a gale, but it is pretty sure to right itself again like a well-ballasted vessel.

Strangely enough, oysters grow on the roots of this tree, attaching themselves firmly by the lower valve. Sometimes the common cove oysters form in great clusters on the points of these roots, the growth of which they stop, and like strange pendulums swing about, tossed by wind and tide.

There is something almost uncanny and gruesome about one of these mangrove swamps. The sense of lonesomeness and desolation, the swinging and creaking of the trees as the tide makes in and out, or the wind blows among them, and the rattling of the pendent and often shell-laden air-roots, the impure, greenish water, and above all a noisome odor that never is absent, and the swarms of mosquitoes that here find a home, all these make it a place to be shunned by every one but a naturalist.

Mud and débris wash in and accumulate, and in a few years, when circumstances are favorable, the mangrove barrier has been the means of building an island which keeps its head above water except at high tides. Other trees, not quite so aquatic in their habits, now come in and find a congenial home.

A Mangrove Island.

More débris is washed in during very heavy storms, and lodges in the almost impenetrable thicket.

Trees of one species send up from their roots thousands of quill-like spines, in some places so thick that they almost touch each other; and these bind the loose soil together wonderfully, and a great deal of rubbish and small drift is caught. From the very first there seems to have been a fixed purpose to build an island, or extend the shore, and everything works with that object in view.

Even the storms, which sometimes sweep away acres of mangroves and the land they have so laboriously builded, on the whole wash up more than they carry away; and I have often seen these large trees which had been torn loose by the violence of the sea and thrown up on the beach, or among other mangroves, taking hold and growing as vigorously as though nothing had happened.

The mangrove rarely attains a height of over twenty-five feet wherever it is found throughout the American tropics, and as one travels northward it gradually diminishes in size, until it becomes a mere shrub, and finally disappears altogether somewhere in the vicinity of Cedar Keys on the west coast, and in a corresponding latitude on the east side. This is no doubt on account of the increasing cold of winter, as it is a tropical tree and will stand but little frost.

But, strangely enough, in the vicinity of Rogers River, and at Biscayne Bay on the opposite side of the state, it grows to a great height, sometimes reaching a hundred feet, forming dense forests, and having stems as straight as an arrow and but very few branches.

These are the only two regions in which such a lofty growth of this tree is known, and at these places it is so different from the ordinary form that some naturalists have taken it for a different species. It is quite durable and resists the action of the boring-shell, so destructive to piling and shipping, better than almost any other wood known.

From these two regions the trees have been sometimes cut and shipped to Key West to be used in wharf-building, but the labor of getting them out of the forests is immense. Stages have to be built on which the workmen stand to fell them, and it is a great hardship to drag them through the mud and water and tangled roots of the swamps, amidst the swarms of mosquitoes and sand-flies which everywhere abound and render the lives of the wood-cutters almost unendurable.

CHARLES T. SIMPSON.

Pineapples.

In England and all over Europe pineapples are eaten only by the few who can afford to raise them in hothouses or pay the extravagant prices for which they are sold. So rare are they on the other side of the Atlantic that they are sometimes hired to impart a crowning glory to banquets, where they may be admired and longed for, but not eaten.

In England a pound, or five dollars, is considered a reasonable price for a hothouse pine, and even in this country as much has been paid for choice specimens of the fruit at the season when they are not in the market. Until 1880 nearly all the pineapples raised for market were grown on the Bahama Islands, whence they were shipped by swift sailing-vessels to New York or Liverpool.

To-day the principal pineapple-producing district of the world is in the United States, on a group of five small islands or keys, lying off the extreme southern point of Florida. On them about seven hundred acres are devoted to the cultivation of pines, but from this small area four million five hundred thousand pineapples were shipped to New York in one year.

The shipment from the Bahamas for the same year was about two-thirds of this amount, while less than a million and a quarter were brought into the United States from other West Indian islands.

The mainland of southern Florida also produces pineapples in great number. On the island of Cuba the sugar-planters are just beginning to convert their unprofitable canefields into pineapple patches.

The Bahama pineapples are losing quality on account of the decreasing fertility of the soil, and the growers are turning their attention to other products. On the other hand, the area of pine lands in southern Florida is extended with each year, and such pains are taken in gathering the crop that Florida pines, like Florida oranges, now command a better price than any others.

Pineapple plants, frequently called trees by the growers, rarely attain a greater height than three feet, and are provided with stiff, sharp-pointed leaves like those on the top or crown of a pineapple, except that they are much longer. In fact, the crown of a pine is in itself a perfect plant, and if thrust into the ground under the proper conditions, will bear fruit in eighteen months. The pineapple has no seed, but is propagated from slips or suckers.

Several slips spring from the base of each perfected fruit, while the suckers shoot from the bottom of the plant. Each plant produces a single fruit and then dies, but its suckers become bearing plants a year later, while its slips, if thrust into the ground, will yield fruit in eighteen months.

A Pine on the Stem.

About ten thousand slips may be planted to the acre, and of these two-thirds will bear fruit. Thus the yield of pineapples is about seven thousand to the acre. If the growers could realize one dollar per dozen on every crop, pineapple-raising would rank among the most lucrative of agricultural pursuits.

But lack of transportation facilities and the dependence of the growers upon commission merchants diminish the profits. The pineapple is perishable, and there are many chances against its reaching a distant market in good condition, consequently it is generally considered best to sell the crop in the field rather than to run the risks of shipment.

One year a certain grower sent three ship-loads of pines to England. Two of the ships were so long in reaching their destination that their cargoes were worthless upon arrival. The third made a quick trip, and landed her cargo in good condition. The pines found a ready sale at eleven shillings, or about two and a half dollars apiece, and the lucky shipper cleared all his expenses, including the cost of his spoiled cargoes, and twenty thousand dollars besides. The next year he repeated the experiment with two cargoes and lost them both.

The Forest Land.

The land of the keys on which pineapples are raised would appal even the heart of a New England farmer, for there is probably no land in the world more rocky that yet produces paying crops. It cannot be worked with plow, hoe or spade; but it does not need working. As soon as it is cleared of its dense forest growth the pine slips are set out in the virgin soil, or rather rock, and the result is awaited with confidence.

The planting is done during the rainy season, which includes July and August, and the patch is kept free from weeds for several months, or until it is no longer possible, on account of the thick growth of their spiked leaves, to work among the plants. Then they are left to their own devices.

A field of pines raised from slips will continue to bear fruit for five years, though after the second year the yield steadily decreases. A patch planted with suckers provides crops for two years only. After this the land is exhausted so far as its ability to produce pineapples is concerned, and must have its vitality renewed by the use of fertilizers or be given over to other purposes, while a new territory is provided for the crop.

This method is the one followed on the keys. Each grower makes an annual clearing of a few acres of forest land, and thus converts it into a pine-producing area. As the keys are small, this process cannot be continued many years; and when the time comes that fertilizers must be used, the soil of the mainland will be as available as that of the islands.

The cutting of pines for shipment north begins in April, when the earliest of the fruit is full, but at least two weeks before it is ripe. The season closes with the first of June. During this time the great level field presents a most beautiful picture.

Its whole expanse is a mass of gold, tinted with varying shades of red and green. Here and there it is dotted with clumps of bananas, palms, dark-leaved mangoes and other tropical trees. Surrounding it is a dense forest or hummock growth, that serves as a wind-break.

The fruit-bearing plants stand so close together, and their aggressive-looking leaves are so interlocked that it seems impossible for any human being to force a passage through their serried ranks. The cutting season is also the beginning of the mosquito season, and whenever a plant is touched myriads of these winged terrors rise from it in blinding clouds.

The sun pours down a fervent heat, and the cooling sea-breezes, that would otherwise sweep the field, are kept from it by the impenetrable wind-breaks.

Under these conditions, the gathering of pineapples is no easy nor pleasant undertaking; but few white men can endure the labor. Most of it is performed by burly Bahamian negroes, who have been accustomed to it from their boyhood.

Even these men refuse to enter the fields until the sun is so high as partially to abate the plague of the mosquitoes, and they generally leave off work by four o'clock in the evening. During the cutting season they receive their board and two dollars per day in wages, though at other times they are willing to work at from twelve to twenty dollars per month.

In the field the laborers wear cowhide boots, canvas trousers, leathern gloves, and often a head protection of mosquito netting. In order to avoid as much as possible the dagger-like points of the leaves and the sharp, saw-like teeth that line their edges, the cutters do not lift their feet in walking through the field, but shuffle along, pushing the leaves aside with their canvas-clad legs.

A Pineapple Field.

They are armed with keen, long-bladed knives, and carry large Bahama baskets of a peculiar shape. In these they bring out from four to six dozen pines at a time.

The fruit that ripens in the field, and is thereby unfitted for shipment, is at the disposal of any one who chooses to cut it. Only those who have eaten a pineapple thus perfected have any conception of its possibilities.

It is as yellow as an orange and as full of juice. Sugar could not add to its sweetness. It melts in the mouth, and above all it is so wholesome a fruit that any one may eat a dozen in a day, if he chooses, without fear of discomfort.

In comparison with this perfect, sun-warmed fruit, the pines that reach Northern cities are hard, sour, indigestible, and unworthy the name they bear. They are, however, the best that can be had until such time as railroads find their way to the remote fields of southern Florida.

KIRK MUNROE.

The Purseweb Spider.

A few years ago I spent an April in Florida upon a plantation at the southern end of Merrit's Island, on the Indian River. While wandering through the palmetto grove of my host, keeping a sharp lookout for the living creatures that inhabit the woods, I noticed many ribbon-like strips of soiled silk hung against the trunks of trees close to the ground. In fact, they penetrated the surface.

These were the nesting-tubes and snares of a species of spider long known as the black Atypus, whose popular name is the Purseweb Spider.

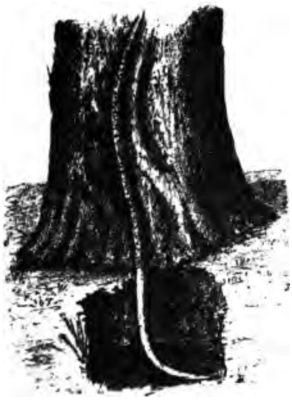
In visiting Florida I had hoped to determine the life behavior of this animal, of whose habits I knew something in a general way. Here was my chance! Everywhere in the beautiful park and surrounding groves and jungles I found its tubular structures. Here, against this palmetto-tree, I counted thirteen tubes. Some are large, some are small. The large are half an inch to three-fourths of an inch in diameter, and eight or ten inches high; the small a few inches long and not much thicker than pipe-stems.

Spider's Tubes.

This is a colony of Pursewebs, young and old, all having found support for their tubes upon one trunk. Almost every sapling that I examined had a similar tube attached to it, the longest that I have seen being fully a foot in length. The first thing that attracts one's attention is that these tubes are almost the color of the tree from which they hang.

They are attached at the top and at several other points by clusters of silken threads that show distinctly against the bark, being of a steel-blue color; but all the rest of the tube is so much the tint of the tree that the careless passer-by would be apt to overlook them, or at least to think them nothing more than stems of decayed plants.

This appearance is not the result simply of the aging or weathering of the web. The spider has assisted the work of the elements, for the tube, from the very top to its entrance into the ground, has been carefully covered with particles of sand and bits of vegetable mold and sawdust, brought from the ground beneath, or scraped from the outer surface of the bark.


Into the Ground.

Evidently, the intention of the builder of this snare is to disguise its appearance. What can be its motive for doing this? We shall see presently.

Meanwhile, let us follow this tube along the base of the trunk to its terminus in the ground. We dig away the sand, which is thickly mingled with brown, decaying vegetable mold, and find that the web runs downward into the ground for a distance about equal to its length above the surface, but generally a little less. Sometimes one finds a short branch running out this side or that into the adjoining sand, and often a rounded cell or den at the end of the underground tube. Within this den one will be pretty sure to find the occupant of the snare, if he has not hit upon it before.

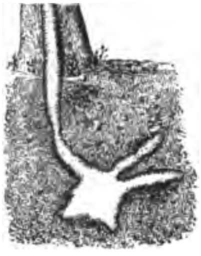
It is an odd-looking creature, as it lies bunched up in one's hand. It has a broad chest, widest at the head, two black, curving mandibles or fangs, eight black legs, rather short and stout, with whitish rings marking the joints of the limbs, a plump abdomen covered with black, furry hairs, and having at the tip four pairs of spinnerets, of which the upper ones are twice as long as the others, and jointed like the legs. This is the Purseweb Spider of Florida. It is half an inch in length or more, if full grown, and of less size down to the little baby spiderling that lives in a tube no thicker than a knitting-needle.

Curious to know something more of the habits of our Purseweb, and especially to find out how it spins its nest, I gathered a number of specimens and placed them in glass fruit-jars, the lower parts of which had been well packed with sand, and in the centre of which a stick was placed. It was thus intended to give them an environment as nearly like their natural habitat as possible.

For a while the captive spiders did nothing to satisfy my curiosity. They lounged around their artificial home, and sunned themselves upon the surface of the sand. But at last I caught one of them at work, and solved the problem that had vexed my curiosity. I discovered how the Purseweb Spider builds its tube.

First she stretched a series of silk lines against the lower part of the stick, fastened at one end to the soil in a half circle, set a short distance from the point where the stick entered the sand. The other ends were carried about an inch and a quarter upward and attached in a like circle to the bark of the twig.

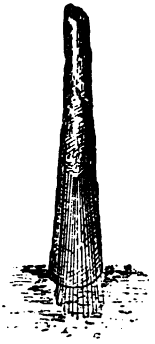
These threads, to use a familiar illustration, looked like a lot of straight bean poles leaned up against the trunk of a tree, their tips touching the bark and their butts placed in a circle upon the earth.


The Den.

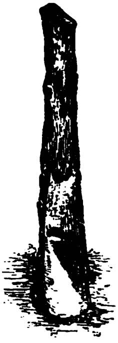
These lines were the framework of a tube. The spider next placed herself inside the frame, grasped several threads with her feet, threw her body upward, and set her little spinning factory working.

Thick filaments of white silk rapidly issued from the spinning tubes, and as her body moved down and up, down and up, this spinning stuff was beaten against the lines, to which it readily adhered. Then the spider ceased her spinning for a moment, and, moving her long-jointed spinners back and forward over the material already spun, she plastered it down and smoothed it over, much after the manner of a mason who is plastering mortar against the lathing of a wall.

One little patch being thus finished, the weaver moved to an adjacent point and repeated the process already described, until at last she had encompassed the whole inner surface and covered herself from view. A similar stretch of silk was plastered against the stick, which united with the part woven against the frame-work lines, and completed the tubular snare. Now I possessed the secret of the spider's handicraft, and it was not long before I was able to determine that the tube is gradually carried up the tree by simply repeating the process already described. That is to say, the tube is built in sections and carried up story after story, until it has reached a height which quite satisfies the ambition of the cunning architect.



First Threads.



Covered.

I cannot affirm that this is the only mode of construction, but that it represents the ordinary manner I have no reason to doubt. It certainly shows an admirable method of work.

One would think that our Purseweb Spider would be quite satisfied with such a structure; but no! there is something more to be done. The tube is entirely too white, and perhaps much too sticky by reason of the silken material of which it is composed, to suit the purposes of the architect. She therefore descends to the earth, gathers a pellet of sand within her jaws, remounts her tube and deliberately proceeds to daub the outer surface with the sand. This process is continued until the exterior of the tube is sanded over.

Thus it seems probable that the peculiar appearance of the webs is not accidental, but results from a deliberate purpose. As the sand in the groves and woods is mixed so thoroughly with brown mold of decayed leaves, the white appearance of the silk is soon destroyed, and the tube, as it hangs against the tree, has the color of the trunk which supports it.

If one cuts the tube open, however, he finds that the inside is kept scrupulously smooth and clean.

Having thus studied the character of the snare and its method of construction, and determined the fact that it is deliberately disguised by being daubed with sand or forest mold, we may ask, What are the uses of this snare, and the purpose of this mimicry? Why should the spider wish to make her tube look like the tree on which it is supported?

If we have patience to sit in the woods and watch during the day, and perhaps also throughout the night, we may find an answer. The trunk of a tree is a favorite highway for insects. All sorts of flies, beetles, and ants are in the habit of passing to and fro upon it in search of food or resting-places. One may sometimes see a column of ants streaming up a tree, and, close by, a similar column streaming down and straggling away into the woods.

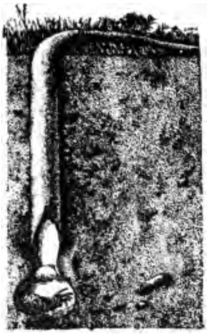
These are foragers who have been to the outmost branches for honeydew, perhaps, and who, having filled themselves with the delicious store, are on their way home to feed the workers, antlings, winged sexes and larvæ.

From such insect travellers the spider secures her prey. See that insect slowly climbing the tree. It straggles, at last, towards the point where the Purseweb snare hangs.

The web lies almost flat against the bark and looks so much like it, and feels so much like it to the delicate touch of the insect, that it is no wonder it does not suspect it to be the fatal trap of its hereditary foe.

But the spider is well aware of the matter. She is lurking inside her tube with her back against the tree and her legs outspread, lying as motionless and seemingly dead as the bark alongside her tube.

The unwary insect has reached that part of the snare just over the spider. Swift as thought the eight claws close in, swinging the folds of the tube around the victim, while with equal rapidity the sharp fangs, and perhaps also the claws, cut from the inside a slit into the snare, through which the jaws are thrust and the insect seized.


The Bent Tube.

The prey is secured, and is dragged into the tube through the opening thus made. When the victim is devoured, the spider proceeds to close the rent it has made, plastering it over with silk and carefully covering with sand the new material used for this purpose, so that it may look like the rest of the snare.

One English species makes a burrow in the ground and an external tube precisely like that of our Florida Purseweb; but instead of carrying it along a tree and attaching it perpendicularly to the same, it bends the tube, just after it leaves the burrow, and supports it upon the surface of the ground or tufts of moss, grass or other vegetation growing on the surface.

An American observer has recently seen a similar mode of trapping prey practised by our Purseweb Spider in North Carolina. When an insect alights upon the tube, the spider is advised of the fact by the agitation of the web, and stealthily creeps up to it. Then she flings the folds of her tube around the hapless victim, slits the snare and drags her prey inside.

HENRY C. MCCOOK.

Corn-Shucking in the South.

In the times when Southern farms were cultivated by the labor of slaves, it was the custom of the farmers in some regions to assemble their hands during harvest, and to assist one another to gather in their crops, so that the burden might be lighter upon each. The corn stood in shocks, and the ground was covered with the golden pumpkins, only waiting to be made into delicious pies. The trees were laden with ripe walnuts and hickory nuts, and many were the marauding parties of boys that invaded the yellow woods.

This was the time for the corn-shucking. Large wagons were driven into the field of shocks, each of which usually contained the product of sixteen hills, or a barrel of corn. The appearance of the wagons was a matter of exceeding disgust to the squirrels, who had looked upon this harvest as their own, and of terror to the swift-footed rabbits, eying askance the wholesale capture of their gleanings, to say nothing of the timid quails who had hidden in the field from the eagle and the hawk to feed and fatten for the hunter's gun.

But, quite unmindful of the claims of the previous occupants, the human invaders went on with their work of destruction until the corn was all torn from the stalk and hauled to the scene of action at the buildings.

Then, when nature had donned her mantle of purple and gold, and the cool air had put life into the veins, the working force of the neighborhood was brought together on a moonlight night, for work, sport and a jolly time. White and black mingled, and every man did his part without regard to race or social standing.

The corn was arranged in two piles upon opposite sides of a double crib, separated by a space of some ten or fifteen feet, all under shelter in case of rain. At each of these piles one division of the party worked, and there was great fun in the choosing of sides. Two captains were first chosen, one for each side; these two tossed up a coin for the first choice, and then, one by one, the rank and file of the shuckers were selected, beginning with the best and swiftest, and so running down to those who were comparatively no account men and boys. The captain was the absolute director of his men, and was to receive a prize if successful.

A Shucking Contest.

When all was ready, the signal to begin was given. Such a falling to as followed! Songs and shouts kept time to the rattling husks and the flying ears. The husks were thrown back as much out of the way as possible, while the corn was tossed into the crib.

There was much excitement when the space between the cribs was too narrow for more than one pile, and this was a huge one. In this case a heavy rail was laid across the centre as nearly as could be measured by the eye, and this dividing line must not be touched, upon penalty of losing the prize.

As the slippery ears were loosened and lessened by the busy hands, the rail toppled. Then the captain's voice came thundering to this or that man, Ned or Bob or Dick, to seize here or catch there; and at the very last, sly jostlings of the rail to get the smaller half for our side made such uproar as was long to be remembered.

Meantime the songs rose higher and higher. A favorite song was a certain monotonous air, led by one of the best singers, the entire force joining in the refrain. The words were made up then and there, and the rhymes were endless, every singer improvising his own.

By and by the last ear was shucked, and one side had won the race. The announcement of the result was the beginning of general rejoicing, even among the beaten, for all had their thoughts upon the banquet in readiness at the farmhouse. The captain of the winning side was lifted upon the shoulders of stalwart men and carried around and around the cribs, amid cheers alike of victors and vanquished, and then the entire party marched to the house in high glee, where the women-folks awaited them.

Such a feast as here tempted appetites that needed no tempting! Roast turkey, boiled ham, snowy rolls, fragrant corn-dodgers, hot coffee, delicious pies, rich butter and cool milk made up the main bill of fare, and for dessert a bushel basket of juicy apples stood in the corner.

By this time the black helpers were at their cabins, enjoying festivities of their own, while the white folks squared themselves for a dance. Quickly the dining-room was cleared; the squeaky fiddle was taken down, its rickety pegs were oiled, and the dusty strings were coaxed into an inspiring walk-around by the black musician.

"Turn your partner! Face her now!" shouted the prompter, who must always be a black man if the affair was to go off well.

At last, when word was given to "cut de pigeon wing an' promenade all!" the floor was a whirl of breathless, panting couples, as the feet flew fast and furious to catch each step the law allowed. Admiring spectators shouted their enthusiasm, and sleeping bats awoke from midnight slumbers to view the wild sport.

In the Cornfield.

Tired nature at last clamored for her rights, and the roosters were crowing in all the neighboring barns and poultry-houses as the guests dispersed under the paling rays of the moon.

EUGENE SOUTHERN.

A Southern Village.

Village and Town Improvement Societies are multiplying in nearly all the states. They stand for local education, for society with a purpose, and are one of the promising expressions of American life. They teach the young to become public-spirited and foster local self-respect.

I stopped for a day at Green Cove Springs, Florida, a town delightfully situated on the St. John's River. It is one of the most beautiful places in the South. It is hewed out, as it were, of the forest primeval; orange-trees fill the air with fragrance, and mocking-birds sing in the clear sunlight. The town looks out on the broad river through vistas of giant live-oaks, gray with age and streaming with mosses. There was discovered here nearly a century ago a spring of transparent water, which has become famous for its healing qualities.

The town gives the stranger a most hospitable welcome everywhere. This hospitality is not an outcome of speculative advertising, but was the thought of a single benevolent citizen, carried out by the Village Improvement Association.

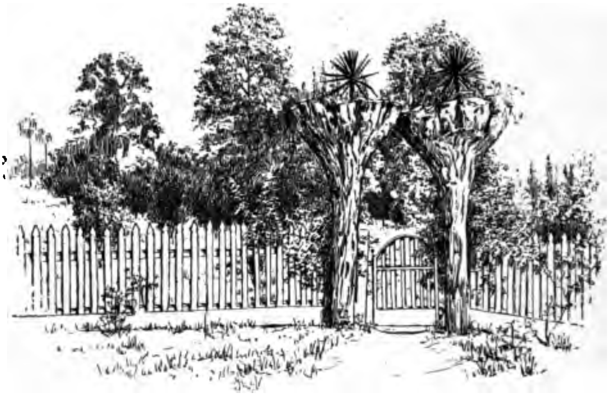
The surroundings of the railroad station have been made a park under these influences, and fenced with the giant logs of the forests, and ornamented with the trunks of cypresses inverted, so as to have the shape of floral fountains.

These inverted cypress trunks are set into the earth and filled on the top with native evergreens and flowers. Near the station the solitary visitor is arrested by a unique-looking structure, in front of which is a sign-board that bears the following legend: "A Place of Rest and Comfort. A Welcome to our Residents, our Visitors and Strangers. Ladies' Village Improvement Association."

On the opposite side of this courteous sign-board is written: "We, the Ladies, bid you Good-by. Come again."

The visitor to this curious house will at once notice an

American flag waving from a tall staff, itself a welcome. Inside he will find a library of excellent books and periodicals, free to every one; beautiful rooms where windows look out on orange-trees loaded with flowers or fruit, or both, that catch the breezes of the river, and that are made musical by the murmur of the pines; and a polite hostess who will give any information which may be desired about the town and river. In the rooms above, the boys have an association, where also a band rehearses which they have organized for playing on evenings and holidays.



The Inverted Trees.

On his way the visitor may be surprised to see painted barrels at the corners of the streets. The Boys' Village Improvement Society use these for the purpose of collecting garbage from the public ways, so as to keep the streets clean. Some of these gay barrels have rhymed instructions. Here is one of the "pieces of poetry:"

My name is *Empty Barrel;* I'm here for a meal;
Pray fill me up, kind stranger, with trash and orange-peel.

HEZEKIAH BUTTERWORTH.

St. Augustine.

Out of a long region of shadowy palm crowns, sunny orange groves, and swamp fields of glimmering palmetto, the train swept into the open country by the sea, and crossed the St. Sebastian.

What a wonderful change! There is no other like it anywhere. America seemed to vanish at the river. An Oriental city of airy towers, red-tiled roofs, and acres of palaces half-buried in ancient trees rose before the eye. The Spanish tales of Washington Irving came to life again in memory. Were we looking out upon some conquered Moorish town in the Spain of the conquerors?

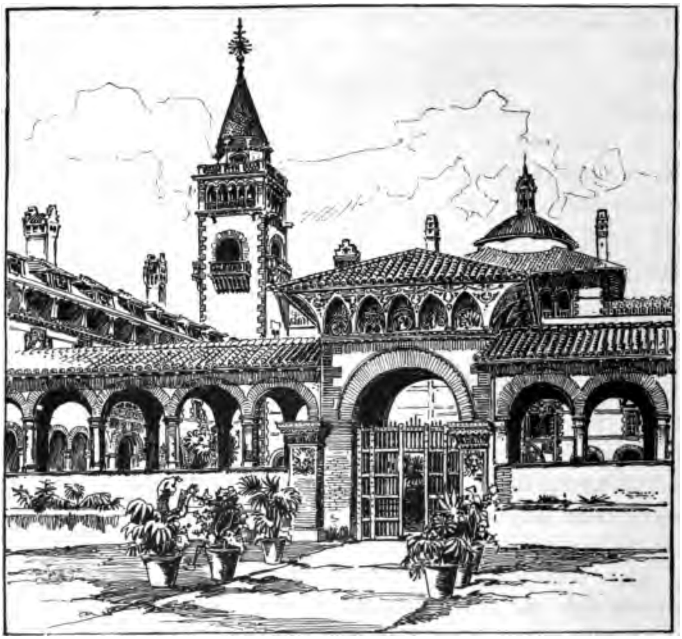
My head became the region of romance from the moment the turreted roofs and hanging gardens began to fill the eye. The palaces of shell marble before me had arisen since I last saw St. Augustine, as under the wand of an enchanter.

The train stopped at a long station, and we stepped out into a tropical garden. The railway stations in England are famous for their flower-gardens, but we never saw there any like this.

I stopped a moment to view the scene before me. The town lay under the quiet blue sky, green with fringes of orange groves. The sky itself was wonderfully beautiful. It was as soft as that of Seville, a delicate blue arch over the luminous air. The balmy Gulf winds just stirred the gray Spanish mosses in the old live-oaks about the town; pinnacles everywhere kindled and blazed; open balconies and airy corridors, all rising over acres upon acres of red-tiled roofs, and trees eternally green. It was my first view of New St. Augustine.

"Have a 'bus for the Ponce?" He Americanized the fine old Spanish word. It seemed like the throwing of a bottle of ink against a masterpiece of tone color.

My little cousin pulled me forward, and hurried me toward the town. At every step the wonder grew. A long line of carriages swept ahead of the foot-passengers and travellers, and these were already being welcomed by the Spanish band. I was in the land of fancy again. America had at last produced a poem of mosaic and native stone gems and sea marbles as romantic as the Taj, as lovely as the Alhambra; it was here.



Front Entrance to the Ponce de Leon.

"I am told that Flagler spent six millions of money on his hotels, and is going to lay out four millions more. Do you think that he will ever get his money back again?"

This was prosaic enough, and clipped the wings of my fancy again. It referred to the man who built the two principal hotels and the Memorial Church. There was something really noble in the answer to the mysterious question which I had heard behind me.

"I think that Mr. Flagler feels a patriotic pride in what he is doing; that he is a true American gentleman, and does not consider the matter of gains or losses at all. What he has done is a historic credit to the whole country. A man who so spends his money is a benefactor."

The Spanish hotel palaces now confronted us, and we stood before the two lions' heads at the gateway to the Ponce de Leon, under the iron portcullis and its beautiful arch of tracery and airy colorings. Could this be America? We stopped to look around, amid the odors of rose gardens, the flash of fountains and the music of mandolins. Courts, turrets, Moorish towers, loggias and cool retreats! acres of red roofs, with art and beauty everywhere!

There was a pull at my sleeve.

"Let us go up to the Children's Playroom. I want to see the Devil among the Tailors. We shall have time to see these things afterward."

"But what do you mean by the Devil among the Tailors?"

"Oh, don't you know? It is a great game down here. Everybody goes to see it. You spin a steel top on a marble surface, and it goes whirring into a great doll-house, all full of little doors and rooms. In the little rooms the tailors are at work, and the top bounces around until it goes into every room and knocks over all the tailors. Come, and I will show you."

"But what do I care for a toy game amid all of this magnificence!"

"Oh, there is too much of it! It makes me tired! I like to see something I can understand."

Oliver Goldsmith once attracted much attention on a London street until there came along a man with a hand-organ and a monkey. He was then left to pass on unnoticed. He thought the world was very strange and changeable.

The Ponce de Leon's gorgeous courts and rooms all seemed to lose their interest for young people after some genius introduced into the Children's Playroom at the top of the building the very funny game of the Devil and the Tailors.

I allowed the persistent little hand to lead me on. We passed through the court,—who can describe it?—through the reception-room, all so bewildering as to be oppressive, amid music and flowers and tone colorings, over pavements of beautiful stone.

Rotunda of the Ponce.

Up we went to a room in the rotunda, all beauty and balconies, that looks out on pile upon pile of historic art. I found myself amid a crowd that surrounded the seemingly magic toy.

Presently a small, bright-looking girl drew the string around the steel top through a hole in the board framework of a little platform of open-topped rooms, so as to give it force. It began to spin on the polished surface. It found its way into the first little room and knocked over the tailor. It bounded around the room until it found the next little door, when it entered and continued its destructive work.

It went on and on till it entered all the rooms and knocked down nearly all the poor tailors. There was a joyous shout, and the number of the tailors overturned was marked upon a blackboard. It was fascinating, but what was I doing here in a children's playhouse, while I was on such historic ground?

There were the landing-place of the poetic old Ponce de Leon; the scene of the Spaniards' Mission and the Huguenots' suffering; the historic Matanzas, green with eternal palms; gray Fort Marion, survivor of so many national changes; the decayed plantations of the Minorcans, and the shell lands of the Seminoles.

Here rose the pillar of stone with the arms of France; here Sir Francis Drake, who plowed a sea furrow around the world, came pillaging the coast and returned thence for England with a ship of gold; here Menendez reddened the land with noble blood; here Father Juniper preached and Ribault sang on the River of May, now the St. John's.

I broke away from the bewildering little game, and went down the bewitching palace stairs. I glanced at the famous dining-room and its panorama, where the exploits and dreams of old Ponce de Leon appear as if in a vision. Then I went out beyond all the great area of the palace to the Plaza and the old sea-wall.

The sky was flushed with the sunset, blue and amber and crimson. I had stood on the same place years before, and had seen the same Old Market by the waterside, and the white shaft of the Spanish monument.

But old St. Augustine was gone. The frost had withered its ancient date palms, and the fire had swept from the Plaza the old cathedral and its cross of bells. Before me lay New St. Augustine, with taller date palms and a grander cathedral, with new spires and towers, and acres of palace-like structures that had gathered to themselves the Spanish and Moorish art of a thousand years.

I walked along the one grand thoroughfare, St. George Street, northward toward Fort Marion and the city gateway, the only noticeable remains of the elaborate system of fortifications which once defended St. Augustine on three sides. I passed out on the shell road beyond the towers of the gate now dwarfed and humiliated by overtopping modern houses.

I saw not their humiliation but their proud place in the old wall that ran across the peninsula from Fort Marion to the river St. Sebastian. I saw the deep moat in front, flooded at every tide. I heard the sentinel of the tower warn me to return before the firing of the sunset gun, when the drawbridge over the moat would be raised and the gate shut, and there could be no entrance for friend or stranger till morning.

The ditch is filled, the long walls are gone, but proud Fort Marion still stands, the well-preserved and only example of mediæval fortification in America; a magnificent specimen of military engineering of its age, but absolutely worthless as a protection in modern warfare.

HEZEKIAH BUTTERWORTH.

ALONG THE ATLANTIC.

The National Capitol.

The Capitol.

No true American can go to Washington and gaze upon the great white Temple of Liberty on Capitol Hill without feeling his heart beat high with pride and patriotism. Critics may tell us that it will not be a perfect building until the central front is built out beyond the front of the wings, and until the main dome is supported by lesser domes that are visible. But nobody cares for critics when looking at the marble pile rising over the velvet turf and lifting its snowy dome like a cloud itself among the clouds.

Wherever you go, in Washington or its neighborhood, turn about, and there is the dome looking over your shoulder. You see it as you approach the city, you see it when you are far down the river, you see it from Arlington Heights, from the Maryland hills, and out at the Soldier's Home, not only through the famous Vista, where it rises out of the surrounding branches all by itself, like a phantom of old Rome, but as you look over a charming landscape where the Potomac gleams like a silver thread out of the deep blue of the haze on the horizon.

The Capitol stands almost in the centre of the plan of the city. The corner-stone was laid in 1793 by Washington. The building was of freestone from Acquia Creek, painted white, and was originally much smaller and more symmetrical. It was burned by the British in the War of 1812, and was only rebuilt after a stormy debate in Congress, assembled in temporary quarters. But with the growth of the country it was found much too small; the extensions were ordered, the corner-stone was laid, with Daniel Webster as the orator of the day, and they were completed in 1863. The structure has cost, in all, about thirteen million dollars.

One would gather little idea of the size of this building by being told that it is seven hundred and fifty feet long by three hundred and twenty-five broad; one might better comprehend it, perhaps, on learning that its ground plan occupies three and a half acres.

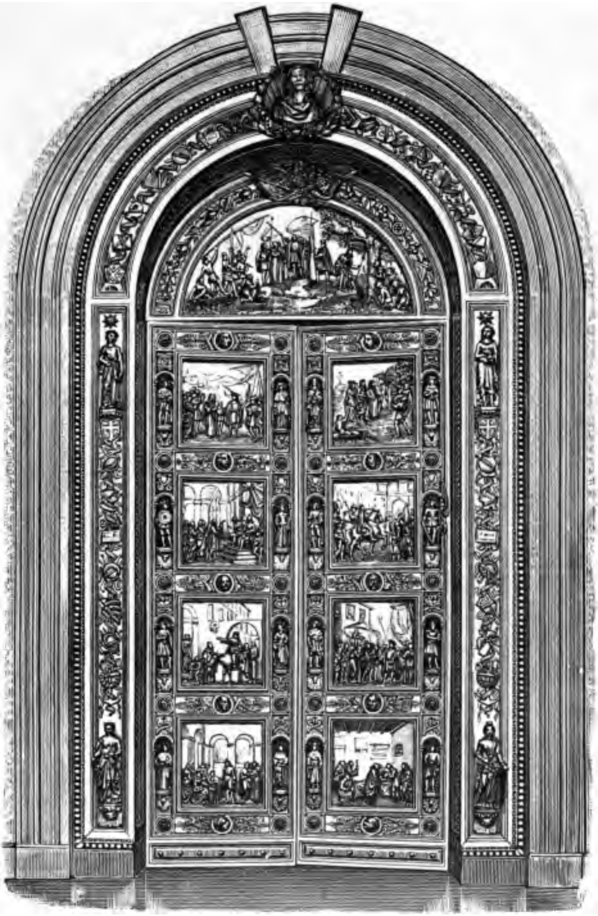
As you stand before it you see that it consists of the old building in the centre, a beautiful thing in itself, of classic style, connected on each side by a corridor of fluted columns with the vast wings, which are built of white marble from Massachusetts, and are each a temple in itself. The one on the south side is the Senate wing; the other is used by the House of Representatives. The whole building stands upon a basement of granite, and beneath that is a sub-basement, hidden by the green turf of the terraces.

Each of the wings has three porticoes of fluted Corinthian columns, every column cut from a single piece of marble. A carriageway runs under the eastern porticoes, by which one enters the basement, the middle entrance opening into the Crypt. On the fronts are the most superb staircases of white marble that can be imagined, supported by immense blocks or buttresses, and so broad and lofty that when one looks at either of them one only remembers the motto: *Sic itur ad astra*. And so it is indeed.

As you mount the central one of the flights, you observe on the pediment, a group carved in high relief representing the Genius of America replying to flattering Hope by pointing to Justice holding the Constitution; a corresponding group, by Crawford, occupies the same position on the front of the Senate wing.

On the flat top of the upper buttress of the main stairway are two groups of statuary, one representing Columbus holding a globe, with an Indian girl at his feet; and the other representing Civilization, or the Settlement of America, by means of a hunter with his dog saving a woman and her boy from the tomahawk of an Indian.

The portico itself here is one hundred and sixty feet long, and carries twenty-four columns, each thirty feet high. In niches at either side of the great doors are colossal figures of



The Rogers Bronze Doors.

Peace and War, and over the doors is another bas-relief representing Fame and Peace crowning Washington.

Here open the great Rogers Bronze Doors, nine feet wide and seventeen feet high, of solid bronze, weighing ten tons. They were designed in 1858, and cast in bronze three years later at a total cost of twenty-five thousand dollars. They represent scenes in the life of Columbus, and attract attention not only because of their historical interest, but also by the harmony of design, and the beauty and skill with which their panels are marked out.

As you pause and look back, you have the Capitol surrounded on every side by an ample space of greensward; directly in front of it stretches a paved space in which is Greenough's huge statue of Washington, and on either side of that and beyond it, picturesquely enclosed by low copings of colored stone, is a park exquisitely laid out with flowers and urns, fountains and lamps and many trees.

Over all this beauty towers the dome, rising from base to crest a height of three hundred and seven feet. As it clears the top of the building, it rests first on an octagonal base; above that it is enclosed by columns twenty-seven feet high, surrounded by a balustrade; at the apex is the lantern, fifty feet in height, surrounded by another row of pillars, and on the top of the lantern is Crawford's colossal bronze statue of Freedom. This dome is entirely of iron, painted white, and weighs a little more than eight million pounds. It is supported by solid masonry, and by forty columns carrying arches which uphold the floor of the rotunda.

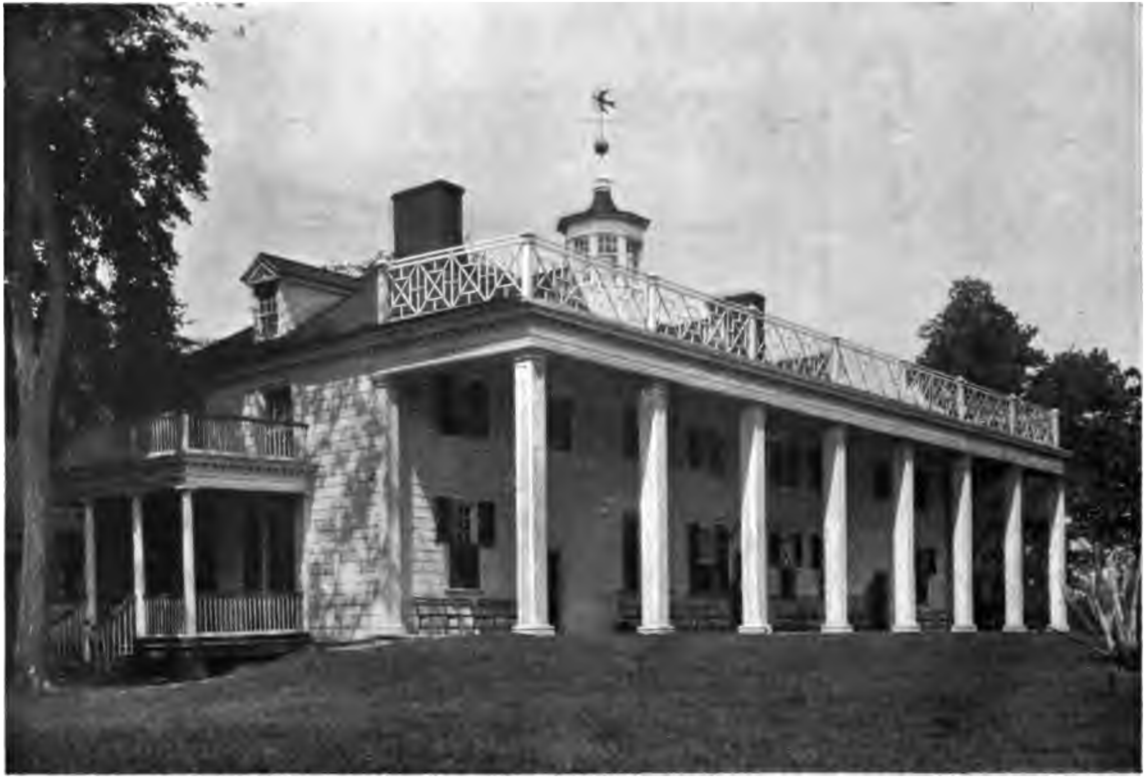
It is not, by any means, the largest dome in the world; there are several larger, but we doubt if there are any more beautiful, more buoyant and perfect. So you would think if you sometimes saw it early in the morning with the mist streaming away from it as clouds are stripped from a mountain side; or at night when the light burns at the summit, and shines over the town, announcing that Congress is in session, and almost giving it a place among the stars.

In summer, sometimes, when Congress sits in the night, and the radiance gleams from the dome and from all the windows, and the moon shines full upon it, the great white splendor, sitting in the dense greenery of its trees, has seemed the very palace of light itself. One hardly knows whether it is more beautiful then, or when, unlighted above, on a dark night, the lamps twinkle in long distances under the arches of the outer basement, the lines of columns retreat spectrally into the gloom, and the dome soars above, a shadow on the shadow of the midnight heavens; or when, on a spring morning, as one comes up the avenue, one sees it throned above the tree-tops of the western side, that rise from banks purple with violets.

Capitol from the Mall.

The chief attractions of the Capitol belong to the seasons when Congress holds its most important sessions, but its outward beauty is best displayed in summer-time.

HARRIET PRESCOTT SPOFFORD.



The Mansion at Mount Vernon.

Mount Vernon.

A trip to Mount Vernon is one of the chief pleasures of the springtime to visitors in Washington. The steamer leaves the wharf every morning, skirts the low, green grounds of the Arsenal, and passes the mouth of the Eastern Branch, in the bay of the Potomac, which is overlooked by Arlington Heights, and a little above spanned by the Long Bridge.

The steamer stops at Alexandria, quite an ancient and grass-grown city, where there is a church of which George Washington was a vestryman. Pursuing its way, presently the passengers may see a lighthouse which stands near the Initial Stone marking the Virginia boundary of the district, and shortly after stopping at Fort Washington the boat touches the little wharf at Mount Vernon.

In a hollow, midway between the river and the house, is the tomb of the Father of his Country. Near it are the obelisks of the later Washingtons. Through the grating of the door may be seen the two sarcophagi which enclose the remains of Washington and of his wife.

Here Lafayette paused to do honors to his old companion in arms; and in pledge of peace is a tree planted by the grandson of the king against whom he fought.

The mansion of Mount Vernon stands on a lofty green bluff, and commands a wide and delightful view of rolling woods and river, retreating into that alluring blue mist which haunts Southern horizons.

The mansion house itself is of wood, squared in blocks, of a cream color. It has an immense portico with stone steps, and with large pillars going to the top of the second story, which is surmounted by a cupola and balustrade.

On the lawn is a very large magnolia-tree, planted by Washington himself, and some ash-trees. On one side of the house is a garden also laid out by Washington. One cannot but think how delightful, in the olden times, life must have been here in summer, when the days are long.

The estate was inherited by Washington when he was about twenty years of age, from his eldest brother Lawrence, who had named it in compliment to Admiral Vernon, with whom he had served. It had previously been used for little more than a hunting-lodge. The new owner added wings to it, which gave it its length of nearly one hundred feet.

Somewhat removed from the house are the kitchens, smokehouse and laundry, the spinning and weaving houses, the remains of the servants' quarters and the stables. New conservatories have replaced the old ones, which were the delight of Mrs. Washington, and which were destroyed by fire. On the whole, it seems to have been rather a princely residence according to the manner of life in its day.

The buildings and grounds were formerly very much neglected. In 1856 the place was purchased by an association of ladies, Mr. Edward Everett writing and lecturing for some time in their aid.

Within, the house used to be desolate enough, cut up into some twenty small, dark and dreary rooms. The dining-room was empty of all save its very splendidly carved marble mantel. The library, where Washington loved to sit over his work, and in which he warmed himself in coming in from the cold on the last evening that he spent out of his bed, was stripped of every book. In fact, nothing was left but Eleanor Custis's harpsichord to tell of the old merry life.

But since the ladies of the association took it in hand it has presented a very different aspect. The rooms have been furnished by the ladies of various states by restoring the furniture of the family or of the generation.

Among others, there is Lafayette's room, fitted up appropriately, and on entering Washington's room you will find restored to it the bed on which he died. His wife, who after his death was unable to open the door of that room, breathed her last, two or three years later, in the room above it.

In one of the parlors are certain portions of Washington's garments, one of his swords, his spy-glass, a part of his theodolite. Copies of Trumbull's and Stuart's portraits of him are in the dining-room, with Rembrandt Peale's painting of Yorktown, which portrays him with his generals about him. Other paintings are on the walls, and many objects of note attract the patriotic stranger.

The Main Hall of the Mansion.

But probably as interesting a thing as any on the place is the great key of the Bastile, which Lafayette sent Washington by the hand of Tom Paine. You feel, in looking at it, the dreadful sorrows and tragedies on which it has turned, and it seems like a seal on our liberties to have it hanging at last in so sacred a place.

Outside the doors, the old gardens, set in their high brick walls, are exceedingly inviting. The breast-high hedges of box are full of a spicy odor. One sees the descendants of some of the flowers which made life pleasanter to Washington himself, and one crushes wild hyacinths in the grass of the lawn as one walks.

The question naturally arises, what spot can be more delightful than those lawns and gardens on the Virginia hill-sides, with the historic house close at hand, and the senses pleased with the odor of flowers, the songs of birds, and the beauty and stillness of river and forest.

Washington's Tomb.

One is apt to wonder if the groups, gaily lunching and talking and exploring, have any realization of the greatness of the character of the man who so often paced these paths, and so loved the quiet and the pleasure of his farm; if they appreciate the integrity and honor and cool courage, the dignity and devotion to duty, the modesty and the magnificence of Washington; if they ever think that there is no character in history, among its great soldiers and governors, of such simple grandeur, with that equipoise and calm power which are so sublime.

Yet if we could but know, doubtless we should learn that there are few who do not have their love of country and of all manly virtues stirred by a visit to Mount Vernon, and that, as the bell rings and the boat is off, every visitor had been thinking much the same thought.

HARRIET PRESCOTT SPOFFORD.

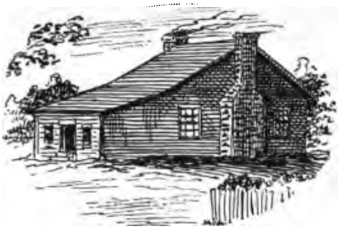
Washington's Birthplace.

In Westmoreland County, Virginia, on the western bank of the famous Potomac River and about seventy miles from the city of Washington, lies Wakefield, the birthplace of the Father of our Country. The old homestead is about one mile west of the town, and upon the crest of a small hill at Pope's Creek, overlooking a broad expanse of the Potomac.

The house itself was a plain four-roomed structure with an immense brick chimney built on the outside at each end. In the best room was a large chimneypiece of Dutch tiles, ornamented with rude Scriptural scenes.

When Washington was a small child the house was burned to the ground, and the family moved to another house on his father's estate near Fredericksburg. This second home so much resembled the Wakefield house that a picture of it gives a fair representation of Washington's birthplace.

All that remained of the first home was one chimney which, being big and built of very large, sound bricks, stood until the autumn of 1893, when it was blown over. The ruins are a great heap of brick and mortar. The bricks are about twice the size of those made nowadays, and the name of the English manufacturer is stamped on the back of each.


Boyhood Home.

The mortar is very firm and hard, despite its exposure to the elements for over a century. The pile of débris is still almost intact, for relic-hunters do not go there. Indeed, most people think that Washington was born at Mount Vernon, which he inherited from his brother Lawrence, with whom he lived much of the time after their father's death.

The birthplace has not always been forgotten, for in the year 1815, George Washington Parke Custis, the grandson of Mrs. Washington, placed on the old foundations of the house a suitable piece of freestone inscribed with the words, "Here, the 11th of February, 1732, George Washington was born," but no care whatever has been taken to preserve that tablet.

After many years of neglect steps have been taken to mark Washington's birthplace with a suitable monument. Such a memorial was suggested many years ago, but it was not until June, 1879, that Congress took any action in the matter. Then an appropriation of three thousand dollars was secured, and the Secretary of State was instructed to see that it was properly expended.

Site of Washington's Birthplace.

Nothing was done till the following year, when Mr. Evarts, then Secretary of State, after he had returned from a visit to Wakefield, asked an increase in the appropriation to thirty thousand dollars. He also submitted designs for a commemorative structure, to be built of granite with a tiled roof, and a bronze tablet bearing an appropriate inscription.

Bronze doors and windows were to be so arranged with screens that the interior of the structure might be plainly seen from the outside. The proposed building would require no care; would be dignified and graceful in proportions, and be constructed to endure for centuries.

In the year 1881 Congress granted the appropriation of thirty thousand dollars for the purchase of the old homestead and erection of a monument. The Secretary of State immediately secured the transfer of the property to the government, with the right of way to a suitable landing-place.

Then authority was asked for the construction of a wharf of iron screw-piles with a timber deck. Nothing was done in the matter for almost nine years; then Congress authorized its construction, at a cost limited to eleven thousand dollars, to be deducted from the original appropriation of thirty thousand dollars. The Secretary of State at once delegated the execution of the work, and in 1894 it was completed.

So now all the work is done with the exception of erecting the memorial structure, the character of which has not yet been decided upon. Perhaps a simpler and more rugged structure would be better suited to the character of Washington.

When Washington's birthplace shall have been properly marked, it is probable that many who make the pilgrimage to his tomb at Mount Vernon will continue their journey a few miles farther down the river to the old homestead where his inestimable life began.

JOHN W. EWING.

The Luray Cavern.

The Luray Cavern, in the Shenandoah Valley in Virginia, is so much superior to the Mammoth Cave in beauty, that a competent observer, who has visited both, has compared them respectively to a lady's parlor and a great barn.

About a mile west of the little town of Luray lies a gently rising ridge, under which the cavern extends. You might drive by the spot a hundred times without suspecting the existence of anything remarkable. Indeed, the cavern was not discovered until 1878, when a strolling photographer blundered upon its mouth and entered it. Even to-day it contains galleries and recesses which never have been fully explored.

But it has become so well known that more than ten thousand persons visit it annually; and so great are the variety and beauty of its formations that a committee, specially sent from the Smithsonian Institution in Washington to examine it, has reported that, "Comparing this great natural curiosity with others of the same class, it is safe to say that there is probably no other cave in the world more completely and profusely decorated with stalactites and stalagmites than the Luray."

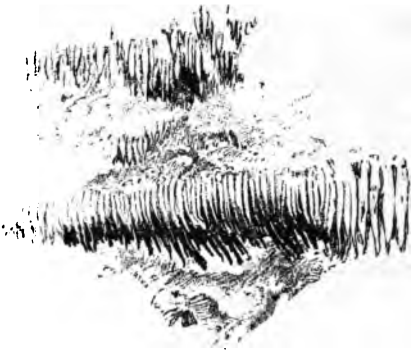
The cavern is a great hollow in a long limestone range. Its cause was the passing of a current of water through the limestone while this was in process of hardening during some past period. After the hollow had been shaped roughly, drops of water, each containing a minute quantity of lime in solution, began to drip from the top. Some clung to the roof and to each other long enough to deposit their burden of lime, and thus points of limestone, like icicles, gradually extended downward. These are called stalactites.

Other drops fell to the floor, and built up a series of pinnacles known as stalagmites.

In time, as the stalactites grew down, while the stalagmites beneath them rose higher, many united and formed massive yet graceful columns. Some drippings from the side walls grew out and crystallized at various angles, and in many diverse shapes, into formations properly called stalactites, but also termed helictites.

These processes still continue, but are so gradual that their annual accumulations are perceptible only by the most skilful measurements. Their result is a palace of wonders surpassing the most marvellous descriptions of fairy-land which the human fancy has invented.

Entering the little house above its mouth, the visitor pays a dollar, puts on overshoes to guard against the damp floor of the interior, receives a tin reflector holding a candle or two, and follows his guide into the opening.



Fish Market.

The principal halls and galleries have been supplied with incandescent electric lights; but candles still are necessary to illuminate the deeper recesses, and also many particular formations, the beauty of which is in the exquisite proportion and finish of their details.

Without expert aid many of the most noteworthy sights would be overlooked. The guide also acts as a watchman, for thoughtless or malicious visitors have injured certain formations in an effort to obtain souvenirs.

The guide leads the way down a dim, sloping passage. As you emerge into the light cast by an electric burner, he remarks, "This is the Vegetable Market." You look around and catch your breath in surprise.

In a large alcove at one side you behold, hanging from the roof or the walls, or piled upon the floor, what seem to be hundreds of beets, carrots, turnips, potatoes, bunches of asparagus and heads of cabbage, each only a stone, yet almost as perfect a reproduction of the familiar vegetable as if a skilful sculptor had chiselled it.

You find it hard to believe that nature alone is responsible for these apparent carvings. They bear examination, too. The illusion does not vanish. It does not depend upon contrasts of light and shade, nor much upon the aid of the imagination. They are nearly as like vegetables as if they had been carted in from the neighboring farms.

Soon you enter the Fish Market, which is similarly amazing. Here the limestone has taken the forms of fishes, and you seem to see tons of perch, trout, bass and shad hanging or lying in orderly rows. The illusion is completed by the drops of water which drip from their tails.

Turning a corner, you enter next a vast gallery, five hundred feet long and one hundred wide. Although not proportionately high, it is larger than many a cathedral. It is the Elfin Ramble; and if ever the underground fairies desired a play-room vast enough for a multitude at once and full of hiding-places, they had it here.

A little farther on a shallow pit is seen, which has a petrified human bone embedded in its bottom. The guide here relates the legend of Massanutto, an Indian chief, said to have deserted his squaw for a pale-faced bride, and therefore to have been shut into the cavern to die by his tribe.

But what is this? A blanket hung from a line? Yes, and not only in shape, size and apparent texture does it seem genuine, but red bands run evenly across it, a few inches from the edge, reproducing the stripes upon a real blanket.

And what is this? You hardly need the guide's reply, "This is the Saracen's Tent." The peculiar, dome-like canopy and the gracefully flowing curtains which formed the Oriental tent are before you in this stately yet exquisite structure of stone, into which you actually can enter.

Next comes the Giants' Hall, less beautiful than grand, but fit for an assembly of the Titans, containing several enormous connected rooms forming one huge apartment. Gigantic columns rise on either side, some simple shafts, of which the only striking features are their massiveness or their symmetry, and others adorned with capitals and decorative work, like those of the old Egyptian temples.

Hovey's Hall, near by, exhibits quite a number of well-proportioned statues, some being draped with much grace. These lack distinct features, but at a short distance one almost might imagine one's self in the Louvre. One such statue, dimly visible in Pluto's Chasm, a deep cleft in the side of the cavern, well merits its title, the Spectre.

An object which lingers long in memory is Titania's Veil. Passing around an enormous column into a huge recess, one perceives, as it hangs loosely in folds from a sort of branch, a surface resembling the veil of a bride. It is transparent, and its texture and ornamentation are like those of delicate lace. No masterpiece of the looms of Brussels or Valenciennes ever surpassed its indescribable elegance. It appeals most strongly to the feminine eye, yet all appreciate something of its rare beauty.

Saracen's Tent.

Another charming spot is the Bridal Chamber, which contains many of the furnishings of such a room. There is a cathedral also, which alone would reward a visit, with its fine columns and the tracery of its roof. Moreover, it contains an organ, which has pipes almost as regular as those to be seen at York or Canterbury.

The Chimes deserve mention, too. At one point the guide indicates a group of five small columns, by striking which with a mallet he produces a succession of sweet, bell-like tones delightfully musical.

Frozen Fountain.

At another place a frozen cascade, as wide and high as the side of a large house and glittering like an Alpine glacier, leaps from the wall of a deep recess.

The prevailing color of the walls is a dull cream-white, but there are streaks or surfaces as dazzling as alabaster, and others are tinted in red or blue. Here and there in the cavern also are charming pools, and even lakelets, so transparent as to be almost invisible. Indeed, many a visitor has stepped into one before discovering where he was.

These are but a few of the wonders of the Luray Cavern; it is impossible to describe them adequately. That there is a limit to the power of language is never realized more distinctly than when one tries to portray such marvels.

MORTON DEXTER.

On the Carolina Banks.

Bogue Banks is the name given to the strip, or rather the strips, of land which lie off the coast of North Carolina, and follow its course from Beaufort Inlet toward Wilmington. The banks vary in width from a few hundred yards to two or three miles, but whether wide or narrow, they are nothing but sand-banks.

Along the entire seaboard of North Carolina the mainland is separated from the ocean by a narrow fringe of such sand-banks, leaving Currituck, Albemarle and Pamlico Sounds on the land side of them, and forming a frail and insignificant-looking but impassable barrier to the ocean waves. At intervals these banks are perforated by inlets, which form a means of passage from the sound to the ocean.

Since they are composed almost entirely of fine white sand, the surface of these banks is constantly moved and shifted by the winds, and heaped up into conical hillocks called sand-dunes, which are from fifty to a hundred feet in height.

Along the ocean side the banks are almost entirely destitute of vegetation, and no sooner does the wind drift the sand into a little hillock than it begins to tear it down and move it elsewhere, or to carve it into fantastic shapes by its ever-varying changes of direction.

Sometimes a hill of considerable size seems to move bodily in one direction without a change of shape, and even to overwhelm houses if they happen to be in the way.

The movement is merely one of the surface sand, and if the wind happens to blow for a long time in one direction, the constant movement of loose particles from one side steadily cuts away that side of the hill, only to deposit the material on the lee side of the hill, where the draught is not so strong. This will account for the apparent movement of the whole mass together.

It is a curious sight to stand on a tall dune and see miles of these conical hills of snow-white sand, with the constant thunder of the Atlantic waves on one side, and the placid waters of the sound and its fleet of little fishing craft and oyster-boats on the other.

During heavy gales from the east, the ocean spray is blown entirely across the narrow places, and the waves sometimes bury many acres out of sight for a time, making such places too dangerous for a habitation. A complete system of life-saving stations is in operation during the winter months.

Occasional areas of tall marsh-grass, with patches of live-oak and palmetto, form the only green coloring to the scene. Droves of wild ponies, called bankers, subsist on the scanty vegetation. They wade far out into the sound for the marsh-grass, and paw holes among the sand-hills to procure fresh water.

Bankers.

Once a year these ponies are corralled by the owners, and the occasion is called a pony-penning. At such times the young colts are branded, and the surplus stock is carried to the mainland for sale.

The ponies are rough and hardy little animals, and need to be broken to the saddle or harness like the wild horses of the Western prairies. When first taken from their native shores they know no food except marsh-grass, and need to be taught to eat in a civilized manner of hay and oats. Sometimes one will almost starve before learning to take strange food out of a manger.

A sparse population of hardy fishermen inhabit these banks, and subsist mainly on fish and game. They are practically cut off from the rest of the world, and seem to know and care nothing for its fashions and follies.

They are content to eke out a scanty subsistence, with an occasional windfall in the way of a wrecked vessel or the capture of a whale.

Perched on the very top of a small sand-hill, near Fort Macon, there is a strange-looking hut or wigwam built of rushes or tall grass. Its thatched sides and roof have a queer, foreign look, reminding one strongly of the huts used by the native tribes of Africa.

It is the shelter of the fisherman on the watch for whales, which are frequently seen and captured near Cape Lookout in February and March. From his elevated place the sentinel can overlook all of that great bend of the shore just south of the cape, and if a whale blows within ten miles, he hoists a flag to warn the fishing crew at Beaufort, several miles away and on the opposite side of the sound. An exciting chase now begins. If there are several boats in the chase, the different crews strain every nerve to be first in the battle.

The fishermen here use a peculiar kind of sailboat called a sharpie, which has a flat bottom, a very sharp bow and an immense centreboard. It spreads a large area of canvas in triangular sails, on foremast and mainmast.

This style of boat is not often seen except on this coast, although it is reputed to sail closer to the wind and be faster than any other. The sails are strained very taut and flat by means of a peculiar boom across the lower and widest part of the sail, and this will explain, in part, its remarkable sailing qualities. The equipment of a crew consists of the ordinary harpoons and lances with the addition of the modern bomb-gun. The last-named weapon is the main dependence of our whalemen, and is usually very effective. Beaufort fishermen do not hesitate to follow a whale many miles out to sea, for if successful their reward is great.

Large numbers of porpoise are caught near these banks in seines made for the work. They furnish some oil, but are sought for mainly for their hides, which make an excellent leather, very soft, strong and flexible. Much of it is cut into shoe-laces, to which it is specially adapted.

The wooded parts of these banks afford hiding-places for deer, and being not very accessible the deer are not often hunted. During the winter months the sounds swarm with many varieties of wild fowl. Ducks, brant, geese and swans may be seen in countless flocks. To a sportsman fond of this kind of shooting there is abundant opportunity to test his skill and endurance.

Sharpies.

In the summer and autumn months the waters about the different inlets are alive with fish. Here the sport with hook and line is probably better than it is anywhere else on the Atlantic coast. Trolling for bluefish and Spanish mackerel is the favorite method of fishing, and is quite exciting. It does not differ except in minor details from the bluefishing in more northern waters, but is rather more exciting on account of the speed of the boats.

In the more shallow waters of the sounds bottom-fishing is much practised, both for pleasure and profit. The boat is anchored in three or four fathoms of water, and the fish-lines are dropped over the side.

Trout, blackfish, sheepshead, small sharks and many other kinds of fish are thus caught. Ladies and children often derive much pleasure from this style of fishing, and it is a frequent occurrence to haul in three or four fish at once.

In places along the shore are still to be seen mounds and shell-heaps of considerable size. They are supposed to have been made by the various tribes of Indians who frequented that part of the coast before the discovery of America by Columbus, and who probably subsisted mainly on fish. Bits of broken pottery and stone implements leave no room to doubt that these shell-heaps were the work of the aborigines.

In many places along the banks the Carolina tea, called yapon, may be seen growing. Its botanical name is *Ilex Cassine*, and it is of the same genus as the mate, or Paraguay tea of South America.

The natives often use the yapon as a beverage, as a substitute for tea or coffee, and by many it is highly esteemed. It possesses valuable medicinal properties also, and was the source of the black drink of the Southern Indians, who considered it a panacea.

Since these banks serve as an effectual barrier to the ocean waves, and many rivers continue to pour into the sounds their constant streams of water and sediment, it is merely a question of time that the sounds will become more and more shallow, until they will finally appear as marshes of reeds and grass and afterward dry land.

THOMAS C. HARRIS.

Georgia Crackers.

Among the many peculiar sights that a traveller sees in a Georgia town is the clustering together on some street of rough and rickety carts, mud-covered, and drawn generally by a bull or an antiquated mule.

There is an air of shiftlessness about them which at once attracts you; a piece of rope for a trace, the harness patched up and held together with wire or cord; or it may be the driver is a tall, lank man with a heavy growth of hair, a rough, unkempt beard, a broad-brimmed felt hat jammed down upon his ears and a general appearance as if it were too laborious a thing to live.

Whatever it is that attracts you, whether mule, or cart, or owner, or perhaps curiosity as to the cart's contents, at any rate you stop and ask a bystander who those fellows are and where they come from. He will say, "Oh, they're some of the po' white trash that live out in the country. Georgia Crackers we call 'em."

A person cannot travel very far through the South without hearing frequently of the Crackers, and curiosity at once prompts you to learn more of them. You go up to the group and ask one of them what he has in his cart, and a reply will come back in a peculiar, drawly tone, "Fat-pine kin'lin's, two bunches fer a nickel. Come twenty mile with it since mornin'."

You are not in immediate need of kindlings and so move on to the next cart, which looks more pretentious. Its load consists of two or three pairs of chickens, some eggs, and a small general assortment of dairy products. Another cart has wood, a hog or a small calf, or small holly or bay trees for garden decoration.

The whole group forms a picture which is highly interesting. These are some of the poor Southern farmers called pretty generally through the South, Crackers, famous alike for their peculiar mode of life, their hospitality and their laziness. As is generally the case with a true lazy man's philosophy, they take great pains to attain a very small result, often coming miles to a town to sell a dollar's worth of goods.

Let us follow one of them in his weary march homeward, over the lonely road, climbing up behind the slow, plodding bull, or else walking beside the cart as it winds its way steadily through the forests of yellow pine and oak trees, which line the road on either side.

The road-bed is of clay and it has a rich red color that fits in well with the dark green of the sombre and stately pines. The oaks and other hardwood trees are leafless, for it is the last of December and the foliage has long since fallen. The holly trees, with their red berries, alone are bright and cheerful.

A Bull Team.

Although the scene is sombre and lifeless, yet the coloring of sky and woods and road is extremely rich and the mighty stretches of unbroken pine forests are always awe-inspiring. But in spite of the beauty and sublimity of our surroundings, the ride soon becomes tedious and tiresome ; for the old black bull moves along very slowly. We haven't yet learned to follow the lead of the owner, who is already sound asleep on the bottom of the cart, trusting to the patient animal to take him home in safety.

We haven't passed a house for some time now, and are just commencing to despair of ever reaching the end of our journey, when a light appears faint and far off through the trees.

The old bull seems to recognize it and quickens his pace. Soon we turn off the main road and go bumping over the roughest of roads through the woods. The jolting at last awakens our host, and he comforts us with the assurance, "Most thar neow." A few minutes more of torture and then the bull stops in front of a small log house in a clearing, and we are at last at the home of a typical Georgia Cracker.

The house has no windows at all, but the logs are so loosely and unevenly put together that the cracks are large enough to let in plenty of light, and also rather more air than would be pleasant on a chilly night.

The roof is made of rude slabs and hewn shingles, nailed on in a way that is very typical of its builder and owner, but which could hardly be called water-tight.

The chimney is built entirely on the outside of the house, the lower part being made of stones picked up off the farm and cemented by the common red clay on which the house rests, while the upper portion is made of sticks laid crosswise and cemented on the inside and outside with the same clay, and finally, to hold the clay in place, boards are braced against it from the outside.

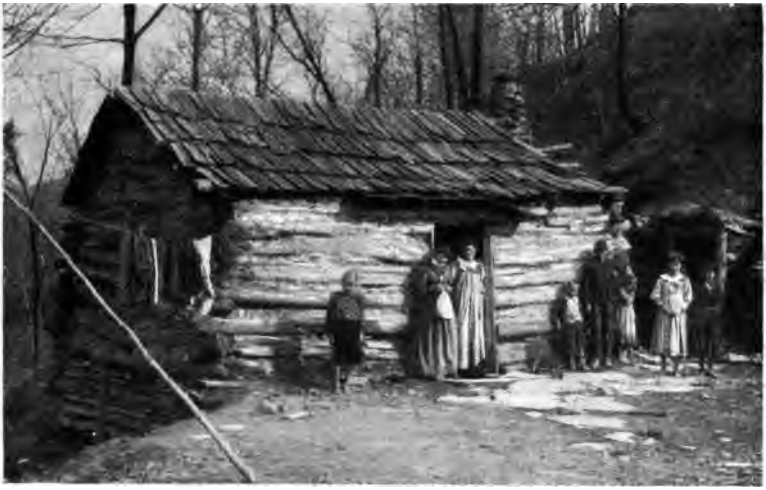
These clay chimneys are seen all over the State of Georgia, and often excite wonder in the minds of travellers at the way in which they are built and how it is that the houses to which they are connected do not burn up.

There appeared to be little difference between the shed used as a shelter for the bull, and the house used for the man's abode, except, perhaps, a slight difference in size, and in the fact that the upper part of the shed, which is used to stow away a winter's supply of corn-stalks, is all open on the ends.

The house was in a picturesque location at the base of a wooded slope on the bank of a small stream. Near by was a small cotton patch, and next to that a corn-field of about two or three acres in extent. This was all the cultivated land visible.

While we are looking at the outside of the house and its surroundings, we are in turn being gazed at by a group of brown-faced, tow-headed children, who seem to find us as strange and curious as we find them and their home.

There are seven of them, three boys and four girls, the oldest boy being about sixteen or seventeen years of age and quite tall, and the oldest girl being about fifteen. All seemed healthy, strong children, their faces tanned by contact with the weather; and although they could hardly be called intelligent-looking, yet they were not without good looks, especially the younger ones.



The Home of a Georgia Cracker.

The boys were all clothed in rough cotton jeans, homespun and homemade, and were barefooted, excepting the oldest, who had so far approached the dignity of manhood as to be the possessor of a heavy pair of topboots. The girls were also clothed in homemade cotton cloth, and were without ribbons or decorations of any kind, and all were barefooted, as was also the mother, who came forward to welcome us with the usual free hospitality.

We entered the house and found a bright fire burning in the fireplace, which served the double purpose of heat and light. No lamps are used by these people, not even candles, and the only light obtainable is that of the fat pine fire.

There was very little attempt at order or decoration in the house. A few cheap chromos, most of them advertisements, decked the walls, and a piece of looking-glass about a foot square was fastened up over a table which holds the common basin and pail of water.

In one corner stands the spinning-wheel and loom, with which the mother makes all the clothes. Near it is a little cupboard, loosely built of rough boards and containing a few dishes, many of which were the worse for wear, and also a few cooking utensils, chief among which was a large iron pot.

On the top of the cupboard was a small wooden clock that had long since ceased to tell of flying moments, whether from lack of winding or not is a question not answerable.

Two chairs drawn up before the fireplace, and three beds completed the furniture of this one-roomed mansion. These three beds were arranged side by side at the farther end of the room, one for the girls, one for the boys, and the last for the parents.

As there were only three in the house, and all seemed to be pretty well supplied with occupants, we wondered where we were to sleep; but when the time came for retiring, which happened about half-past eight, or very shortly after we arrived, the three boys, without waiting to be told and without murmur, coiled themselves up on a pile of cotton in one corner, leaving us their bed.

This primitive mode of life might have many embarrassments to a stranger, but there is no disrobing at night among these people, farther than the taking off of boots and hats, so there is nothing to do but to throw yourself on the bed and go to sleep if you can.

In the morning we arise early, wash at the common basin and use the common towel, and then are given a spoon each and invited to dip into the pot of steaming corn-meal. As an extra treat coffee was served, but without sugar or milk. Such is breakfast, and such would have been dinner and supper, with perhaps a piece of pork with the meal; but we did not wait for any more, and after thanking our host we start out for the next place, to try and hire a mule to drive us to the town again.

To those whose ideal of life is one close to nature there might be many points of attraction in the lives of these people. They retire early and rise with the lark; they do no more work than is absolutely necessary for an existence, rarely looking ahead; living in one room together; eating their standard dish of yellow meal out of a common pot, and drinking their home-made corn-whiskey out of a common bottle; caring little or nothing for education or religion in any form; hospitable and kind to all but revenue agents, and are fairly moral and honest.

But to those who care for any of the comforts or advantages of civilization, one visit to the homes of the Georgia Crackers will be enough, and they will never more long for an earthly Utopia where wants are few and all things are held in common.

W. F. PATTERSON.

Peanuts.

Many people would mistake a field of growing peanuts for a field of clover. During the Civil War the boys in blue often ran with eagerness into clover fields in search of peanuts, and could not be convinced of their mistake until they had pulled up a considerable number of the roots and had been roundly laughed at by their more knowing comrades.

The peanut, sometimes called ground pea or ground nut, is known in the Southern States as the pindar and goober. It is generally believed to be a native of Africa, where it is the principal food of some of the Congo tribes; but four or five species of the nut are found growing wild in Brazil.

In this country it is raised principally in the States of Virginia, North Carolina and Tennessee, and has been more recently cultivated in California.

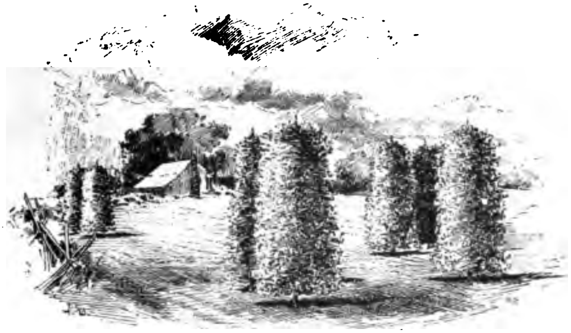
The culture of the peanut is not difficult. Land suited to the raising of corn or melons is generally selected, and care is taken that there be nothing in the ground that would stain the shells.

Peanuts.

Planting-time begins when the danger to plants from frost has passed. The ground is plowed five or six inches deep, and then harrowed. The nuts are taken from the pod without breaking their skins, are planted two or three together in rows about three feet apart and twenty inches from hill to hill, and are covered with two inches of earth. Five pecks of shelled seed are needed for an acre. The work of planting was formerly done by hand, but it is now done by a machine, with which one man can plant six to eight acres a day.

When in a short time the vine is eight or ten inches long and begins to blossom, it is covered with an inch of soil, care being taken to leave the tip end uncovered. The vines blossom profusely with small yellow flowers, and as the flower fades away a sharp-pointed stem grows out from its base, turns downward and buries itself in the ground; on the end of the stem a thick-shelled pod forms, and enlarges rapidly.

All the care that is necessary after the stem returns to the ground is to keep the land free from weeds. The cultivation consists in running a plow between the rows. After the plants have fallen over, they cover the earth so thickly as to smother all other growth.



Stacks of Peanuts.

In October, when the nuts are ripe, the farmer loosens the earth by running a plow under each row to cut off the main roots and throw out the pods. Then he pulls up the vines, to which the nuts adhere, and turns them over to dry. He performs this work only in pleasant weather, and when the ground is dry.

After the vines have lain in the sun for a day, which is generally a sufficient time for drying them, the grower stacks them around a stake about seven or eight feet high. The vines remain in stack from three to five weeks, after which the nuts are picked off, placed in sacks and shipped to market. A vine under favorable conditions bears more than a hundred nuts, and the yield per acre averages forty bushels.

Most of the Virginia and North Carolina crop, which is about two-thirds of the whole crop of the country, is marketed in Norfolk and Petersburg, Virginia. In each of these cities are factories where the nuts are bought as they are delivered by the farmer. The nuts as they appear at this stage, with earth and their stems still clinging to them, are hardly to be recognized as the bright nuts we afterwards see on the corner stand.

Picking from the Vines.

To polish them, and to remove the earth and stems, the nuts are scoured in large iron cylinders, from which they pass through blast fans, in which a strong current of air separates the fully developed nuts having sound kernels from those imperfectly filled, and from empty pods.

The sound nuts fall through the fan upon picking tables, where those which are discolored are taken out, and the bright ones are passed on into sacks which will each hold about one hundred pounds of nuts. Each sack is marked with the brand which indicates the grade of its contents.

The dark and the partially filled nuts are shelled, and the kernels are used by confectioners in making peanut candy. The work of picking over and separating the nuts is performed by little girls, about twenty of whom are employed at every table.

Three varieties of peanuts are grown in this country, the white, the red, and the Spanish. The white, which is the most important variety, has two kernels with pink skins; its vine spreads along the ground, unlike that of the red variety, which grows more upright and in a bunch.

The pod of the red nut holds three and sometimes four kernels, and has a deep red skin. The Spanish is a much smaller nut, with a lighter skin and milder flavor than either of the others. The entire crop is shelled, and used especially in that rich confection known as nougat.

The history of the competition between the home product and the imported peanut is interesting and gives one some idea of the importance of the peanut trade. In 1872, and for several years previous, there were annually imported into New York a half million bushels of peanuts, the greater part of which came from Africa, and the rest from Spain.

Separating the Nuts.

The American farmers gradually awakened to a perception of the profits to be made by raising the nuts. Melon patches were turned into peanut fields, and in 1878 the seed of the Spanish nut was planted in Virginia. The product was found to equal that of the foreign nut, and as it cost two or three cents a pound less to market the crop, it was not long before the imported nut was driven from the market. At present Virginia, North Carolina and Tennessee count goober-raising as one of their chief industries.

The peanut is a more useful product than people in general think it to be. We all know how eagerly it is sought after in the roasted state to help boys enjoy a baseball match or a circus; but its use in the roasted form by no means measures the extent of its value, or the variety of the uses to which it is put.

The nuts contain from forty-two to fifty per cent. of a nearly colorless, bland, fixed oil, which resembles olive-oil and is used for similar purposes. This oil is principally employed in the manufacture of the finer grades of soap.

In 1883 Virginia began to manufacture peanut flour, which makes a peculiarly palatable biscuit, and North Carolina has long made pastry of pounded peanuts. It is also eaten for dessert, and it is roasted as a substitute for coffee.

The peanut is very nutritive. The negroes use it in very many places in making porridge custard, and prepare from it a beverage. The vine forms a fodder as good as clover hay, and hogs fatten on what they find on the fields after the crop has been gathered.

George B. Spear.

Chesapeake Oysters.

The value of Chesapeake Bay for other purposes than those of navigation is in its oyster and fishery trade. Not counting rowboats, there are fully a thousand craft of various sizes engaged in the collection and transportation of oysters in and from Chesapeake Bay, and a large amount of money is invested in the industry.

The oyster-beds are theoretically under the control of the State of Maryland, and its legislature has passed laws intended to regulate the trade. From time immemorial there has been a vast difference between theory and practice, and Chesapeake Bay furnishes no exception to the rule. The laws are openly violated, and piracy has flourished on the Chesapeake as it flourished on the Spanish Main and other parts of the high seas in the seventeenth and eighteenth centuries.

There are two ways of taking oysters from their beds: by tonging and by dredging.

In the first method the oystermen use tongs with long handles; a pair of tongs, with its jaws open, is lowered to the bottom, and then the jaws are slowly brought together to secure whatever oysters come within their grasp. In the other process a dredge, or large rake with curved teeth, is drawn over the oyster-bed. When the dredge is filled with oysters it is brought to the vessel's side by means of a windlass, and the contents are placed on her deck.

There are certain grounds where dredgers may work without interference, and certain other grounds, where the water is shallow, which are reserved for the tongers, and leased by the state to companies and individuals.

The tonging process is slow, but it is not destructive; dredging is far more rapid than tonging, but it is terribly injurious to the oyster-beds where the water is shallow, as a dozen oysters are destroyed for every one that is secured.

The law prohibiting dredging in the shallow waters was enacted in order to preserve the oyster-beds, and raise a revenue for the state, which claims jurisdiction over the bay. The complete ruin of the oyster industry there is threatened unless dredging is prohibited, and the friends of the law say that in a few years there will be no oysters left for either dredgers or tongers to gather.

Where Dredges are Made.

To protect the beds from pirate dredgers the State of Maryland has an oyster police with its steamers and sloops. Down to a few years ago the pirates were held fairly in check by the navy, and their depredations were not very serious; occasionally they came down at night and sailed across the forbidden grounds during the darkness until their dredges were filled, and they were off and out of sight before daylight, unless detained by adverse wind or no wind at all.

There have been many conflicts between the dredgers and the Maryland navy; these conflicts were bloodless for the most part, as the police were instructed to fire only at the sails and rigging of the pirate craft, and must not shed blood except in self-defence.

But sometimes the fighting became severe owing to the vigorous resistance of the dredgers, and the bullets did more than make rents in sail-cloth. Policemen and pirates were wounded, and in some instances killed, during these encounters, and the pirates on more than one occasion were completely victorious.

The pirates argued that they had a right to take oysters anywhere and in their own way, and they prepared to defy the law openly. When the vessels of the navy appeared some of the dredgers surrounded and fought them, while the rest went on with their work without interruption.

Occasionally the pirates boarded the vessels belonging to the lessees of the oyster-beds and forcibly took away whatever bivalves they had on hand; if a despoiled tonger offered any protest he was knocked down and silenced, and in case he made any resistance to being plundered he was flung into the water and had to take his chance of being drowned.

After a few experiences of this sort the tongers lost patience and began to strike back. The lessees of the grounds armed some of their men with rifles and other weapons, and fights between tongers and dredgers were of daily occurrence. Sometimes one party was victorious and sometimes the other; but the dredgers were the more numerous and powerful and the tongers suffered accordingly.

The dredgers proceeded to fit up their vessels for war; they provided themselves with Winchester rifles, which were placed in racks as on board a regular naval vessel, the crews were armed with revolvers, and some of the larger schooners had swivel cannon mounted on their decks.

One of them actually came out one day with a black flag displayed at her topmast and a plank rigged at the side as an intimation that any prisoners might expect to walk the plank in the style of the old-fashioned freebooters of the sea.

For some time the dredgers actually drove off the tongers from the reserved grounds by firing upon them whenever they appeared, and when a police-boat went out to interfere, she was fired upon, too, and her assailants were so numerous that she was compelled to retire.

Oyster Pirates.

The strife has broken up families. A tonger went out one day and was fired upon from his son's boat, his son having gone into the dredging business and turned pirate. The fishermen in the same neighborhood were prevented from setting their nets, and a party of gentlemen who have a duck-shooting club on the shore were also fired upon by these nineteenth century buccaneers.

The tongers of Kent Island bought an old cannon and placed it in a position to command their grounds. When the dredgers appeared the battle began ; the tongers were getting the best of it when their cannon burst, happily without injuring anybody. Then the dredgers went to work and filled their boats. Imagine the feelings of the tongers as they helplessly looked on and saw their oysters dredged up and carried away !

Many of the dredgers are from the eastern shore of Maryland, but the larger vessels are from Baltimore and other Maryland ports, and also from New York. There is much difficulty in obtaining crews for these craft which openly defy the law. It appears that the owners and captains are as lawless in the treatment of their men as they are in obtaining their cargoes.

These men are compelled to work from four in the morning till nine or ten at night ; are fed upon bread and a nauseous mixture called coffee. They have neither beds nor shelter at night, and are exposed to rain and snow and cold all through the winter months.

They are frequently maltreated, and often cheated out of their wages. In short, the lot of the pirate before the mast has always been a hard one, whatever may be that of the captain or the owner of the vessel.

THOMAS W. KNOX.

Maryland Fishing-Farms.

Nothing could be more strongly contrasted than the lives and methods of the New England farmer and the farmer of that long, level peninsula known as the Eastern Shore of Maryland, lying between the Chesapeake Bay and the Atlantic Ocean. In driving along the smooth clay and oyster-shell roads of the Eastern Shore, the first thing that would make the Northern farmer sigh with envy is the absence of stones, big or little. About the only homes to be seen close beside the main roads are the small whitewashed cabins with chimneys built outside, belonging to those negroes whose thrift has secured the coveted five acres and a mule.

The real farmhouses are often half a mile back from the road. A long, private driveway, called the lane, leads to them, through an avenue of trees. The front door of the large, rambling house opens on the lawn, always generous in its size, while the rear door of the hall is equally sure to open on a broad piazza looking out on the bay. The true Marylander is proud of his water-front, and the first hospitable invitation is to come and see the view or to walk out to the bank.

A few of the farms on the main arms of the bay can boast a tiny beach, where the water laps the yellow sand in true seashore style, but for the most part grass grows to the water's edge. Every farmer has his sailboat, and social life receives a constant impetus from it. Calls are made, evening parties come and go, and business engagements are comfortably attended to by boat. Coal for the furnaces, ice for the ice-houses, which must be bought after a mild winter, and freight of various sorts are landed at the small docks.

But the financial help which the bay gives the owners of water-farms is greater than all. A goodly portion of the living comes from its waters, and the sales of fish are great aids to make farming pay. Farms which have a good water-front are worth nearly twice as much per acre as inland farms, but are rarely for sale, as they are kept in the same family for generations.

Six hundred dollars from the season's sale of fish is a fair return for a farm of two hundred and fifty acres with half a mile of shore lines, while many years show even greater gains.

Driveway to the Farmhouse.

The cost of nets, boats and other needs averages about one hundred to one hundred and twenty-five dollars a year. The farmer usually conducts his fishing on shares with the regular fishermen, and if, at the end of the fishing season of sixty days, he has two or three hundred dollars for his half of the profits he is satisfied.

The outlook along the shore of these fishing-farms is curious. By each farm there are two or three long lines of hedging, running out from the shore. This hedging, which begins in moderately shallow water and not directly at the shore, is made of heavy poles or piles driven into the water, each one from twelve to twenty feet in length, according to the water's depth. It is capped at intervals with long poles, to which heavy twine nets are fastened. These nets are wide enough to be half a foot above the water at high tide.

The piles and nets form a wall against the sea, and as the fish swim up or down stream they find this obstruction to their course. Fish never turn backward, and, true to their instinct, they swim along the line of hedging, trying to find an outlet. At the deep-water end of the hedging is a netting, strong and heavily tarred, which is funnel-shaped, the small end inviting the fish to enter. The confiding fish does so, and finds himself in a square room with walls of netting. The fishermen come in their boats at ebb-tide, and carefully lifting the net, empty all the unlucky fishes into the boat.

This room is the fisher's weir, or pound, and is from fourteen to twenty feet square and from twelve to eighteen feet deep, varying with the depth of the water. The weir is provided with a rope, by which the men draw the net up till the fish are all in a small space, and then scoop them out with a hand-net. Fish of all sorts, herring, catfish, bass or rock, white and yellow perch, eels and the like are caught in this way. Herrings, which come in large schools, are caught in great numbers. Sometimes five hundred or more are scooped in; but one hundred is thought a big haul of shad.

Shad are the most valuable and salable, and another method is devised for catching them. Large nets, fourteen feet long and thirty-six feet deep, are made of fine gilling-twine. These nets are hung at each end by wooden rings to poles, which are staked out at quite a distance from the shore. They are weighted by iron rings and hang down into the water like a sheet upon a clothes-line. The shad go up the river with the flood-tide, and at ebb-tide they are found caught by the gills in this fine net. It is certainly not flattering to finny instincts that a slender net should hold fast such heavy, powerful fish. The fish are gathered in once or twice a day, and then are packed in barrels and boxes to ship to city markets.

Strange enough, there are plenty of men who do not consider the fish the property of the fishing-farmers, even when in the weirs, and constant watching alone keeps them from being plundered. The farmers have built little houses along the shore, where their men can sleep nights and keep one eye upon their nets. The only thing that holds these thieves within bounds is a gun loaded with buckshot.

After the fishing season closes the farmer turns his attention to crabbing, though not so extensively. The soft-shelled crab is quite scarce, but he is the same crustacean as the hard-shelled, the only difference being that his shell is soft during the time he is shedding the old one and growing a new one. The fisherman rows along the shallow water and scoops them up with a hand-net. A trap is made for the hard-shelled crab. Poles are driven into the water and connected by strong cords. To these cords other cords, baited with meat, are tied and let down into the water. The crabs come to feed on the meat, and are easily caught in hand-nets.

Terrapin, once so plentiful, are growing fewer and fewer. Some effort has been made to propagate them, but it is difficult and is not generally attempted. Oyster-raising, except for private use, is not attempted by the farmers. To supply the family table, small beds are planted and cared for and gathered by tonging.

AGNES BAILEY ORMSBEE.

How Milk is Marketed.

When the milkman rattles at the alley gate, or the front doorbell tinkles to his early pull on a winter's morning, how many know where the fluid comes from that is carefully ladled from the can into the answering pitcher, or know the system of production and transportation by which it reaches its destination at thousands of houses so regularly and promptly every morning in the year?

There are places in other countries than America where the milkmen drive their cows from door to door, to serve milk fresh and warm wherever needed; but such a method is far too primitive for our large cities and go-ahead people.

It would take a good-sized drove of cows to supply the milk that is consumed in one of the large city hotels, and most of the residence streets of our towns would have a double row of cows and milkers from one end to the other more than half the day, if such were the custom here. Other means have had to be devised to supply the people of our cities with milk.

Winter, when the fields are covered with snow or brown from frost-nippings, is the best time in which to visit a farm where cows are kept for the purpose of supplying milk to cities. Then all the resources of the dairy farmer are brought to bear in order properly to care for his herd, and secure its best yield for market.

When the country is green, when clover grows in inviting clusters, when timothy stands in lustrous tufts, and the green grass mats its tender shoots of which the milking herds may eat their fill, then Nature is doing by far the greater half of the farmer's work. Each cow then feeds herself, attends to her own sleeping arrangements, and makes her own bed.

One winter's day found me forty miles from Philadelphia, driving with a dairy farmer from the railroad station to his home. Nestled against a hillside, his house, with massive chimneys and broad porches, had an old-fashioned air of solid comfort.

It was near the evening milking-time when we stepped from under the sleigh-robes to the swept path at the house-yard gate; so at my friend's suggestion we went directly to the barn to witness the operation. The girls, a rosy, laughing party of them, were selecting their milking-buckets, clean and bright as new pins, from the milk-room shelves, or their milking-stools from the rack outside.

Milking in Summer.

Equipped with these, they entered the wide door of the main barn to pass in the rear of twenty-five or thirty cows, chained by the neck to their feed-bins. The pleasant odor of kine blended with the sweet perfume of hay and ground corn upon which the animals were feeding. Fat, sleek, well-fed creatures they were, clean and warmly bedded with bright straw; for the yield of a dairy is largely increased by liberal feeding and constant care of the cows.

Each girl had her allotment of cows, and for the time assumed absolute control over them. Chubby Gertie, bucket and stool in hand, stepped bravely up on the right of a great red beast, ten times as big as herself, gave her an admonishing poke with the stool-legs, and said, authoritatively, "Stand over, Reddy!" which Reddy immediately did without protest.

Down the girl plumped upon her stool, gave her skirts a quick tuck under herself, nestled her bucket with a slant in the straw, rested her head against the cow's soft flank, and went earnestly to work with both hands at the round, full udder, causing its contents to dash in rhythmic spurts into the sounding bucket.

As the milking-buckets are filled, they are emptied into others much larger, having broad, lip-like spouts and partly covered tops, called strainers. These, when filled, are carried by men to the cooling-room, where the warm, frothy milk is carefully poured through the fine wire strainers guarding the spout, into cans made of heavy tin and bound substantially with either iron or brass bands.

The cans are about two and a half feet high, with wide mouths into which a handled lid fits tightly. They are of two sizes, holding, respectively, twenty and forty quarts. It is in these cans that the milk is shipped to its destination.

Cleanliness and proper cooling are necessities in handling milk. Everything that it touches must be scrupulously cleaned and scalded, and the spring-house or the cooling-room must be pure and well ventilated; if not, sour or distasteful milk is the consequence of the neglect.

As the cans are filled, they are placed side by side in the running water of the cooling-trough, which is of about the same depth as the milk in the cans. The milk is frequently stirred with a wooden paddle until all of the animal heat has departed from it, and here it remains uncovered during the night.

In some places more remote from the city the milk is sent to the railroad as soon as it is cooled, together with the morning's milking, to meet the late evening train; but our farmer rises while it is yet night to hurry off his product to the early milk-train.

Four o'clock in the morning! The milk-cans have been loaded into the bed of the sled, and the horses are impatient to be off. Not a ray of light yet appears in the east, and overhead the bright stars are shining. The horses' feet creak as they tread the snow and the sled-runners sing as they glide over it. We are not alone. As we near the station, sleds driven by fur-capped, muffled drivers join us, coming from all directions, some from five or six miles away.

At the railroad station the sled halts by the edge of a wooden platform at the steel track's side, whose floor is on a level with the car doors. Here is a busy scene. The station agent's calls of "Name?" "How many cans?" "How many quarts?" rise above the jingle of sleigh-bells as he stands with lantern on his arm, noting the names and amount brought by each person.

The Station, Philadelphia.

When the cans have been unloaded from the sleds upon the platform, and registered by the agent, they become in a sense passengers, and the agent proceeds to collect tickets for them. Drawing off their mittens, which they hold in their teeth, the drivers fumble in their pockets until a package of tickets is found. From these each one selects as many tickets as he has twenty-quart cans, or two for each forty-quart, and hands them to the agent.

These tickets represent the passage-money for the cans. In this respect the tin reservoirs are treated precisely as human passengers.

There is a shout: "Here comes the train!" As it glides to the platform, the driver whose morning turn it is to load the milk, seizes a can and whirls it on its bottom edge to the waiting train official; he in turn grasps it, and keeps it whirling across the car until it settles with a thud among a group of every-morning companions from more distant stations. When all the cans are loaded and the passengers are on board, there is a wild wave of a lantern, a shriek of the locomotive's whistle, and on goes the train with its precious burden of life and life-giving fluid.

At every village, cross-road and station similar scenes are enacted, until one, two or three cars are filled with their tin passengers. Before half of the people of the city are out of their warm beds, the train glides into the station. Outside of it are double rows of milk-wagons, gaudily painted, and lettered "Pure Country Milk," "Diamond Spring Dairy," or some other seductive title chosen by the milkman to attract customers.

A railroad official examines the tags on the cans, and delivers to each milkman those marked with his name. The milkman hurries off with them to his wagon, unblankets his horse, climbs to his seat, tucks the blanket about his legs, and away he goes to rattle the alley gates or tinkle the front door-bells along the route he serves.

CHARLES MCILVAINE.

The Statue of Liberty.

The entrance to New York harbor is adorned with the largest statue the world has ever seen. But the idea of thus marking the mouth of a seaport is not new. A statue which may be reasonably compared with Liberty Enlightening the World was erected more than two thousand years ago.

The Colossus of Rhodes was one of the seven wonders of the world. It was twelve years in building and was two-thirds as tall as the Liberty Statue. About 224 B. C. it was thrown down by an earthquake after it had excited the admiration of travellers for only about sixty years.

Engineering science is much farther advanced now than it was two thousand years ago, and it is the opinion of men competent to decide the point, that our statue will be able to withstand the fiercest gales that rage. Certainly extraordinary care was taken to make the foundation upon which it stands strong enough to endure forever.

This statue is the gift of Frenchmen to America. The money to pay for it was contributed in large and small sums by French people of every social standing. The statue itself is one hundred and fifty-one feet high, but the pedestal on which it stands is so great a structure that the statue towers more than three hundred feet from the ground. It is visible twenty-five miles at sea.

During the progress of the work in Paris, thousands upon thousands of interested men and women visited the shops where the statue was building. The French are a very impressionable people, and one who has ever seen a group of them under political excitement can easily see the manner in which they would shout, with nervous enthusiasm, "*Vive la Republique Americaine!*"

A description of the process of building the statue, for it was really built up with copper plates, is extremely interesting.

The Statue of Liberty.

First, the artist Bartholdi made a life-size statue. Next, each part was taken by itself, and multiplied in size according to a definite rule.

Then a framework of wood was built as a sort of mold, and the plates, nearly an inch thick, were fitted to it. Finally all the parts were joined together. But before the statue was shipped to this country it was all taken apart, and was transferred to New York in more than three hundred pieces.

Some of the measurements are astonishing. Ten men can stand with comfort inside the torch which Liberty holds aloft with a right arm forty-two feet long. Forty men can stand within the head, which they reach by a spiral staircase within the structure.

The statue stands in New York Bay, but it is an object of pride to every American, both as a compliment paid to the greatest republic in the world by the greatest of European republics, and as a conspicuous emblem of our proud but true boast that here the torch of liberty has burned with the brightest and steadiest flame.

Moreover, the statue was not presented to New York City, or to the state, or to the national government, but to the American people, and while there are good reasons why New Yorkers should be specially interested, it is difficult to see how any true American can be indifferent.

The statue is the gift from one people to another; from Frenchmen, who lôve liberty, to Americans who love it no less, although it may be true that the methods by which the French sought to win liberty are not ours, and that they do not recommend themselves in all respects to men who love law as well as liberty.

Some men, also, will be disposed to admit that a colossal statue standing on an island in a harbor is not the highest form of art. But what of it? Let us look to the spirit of the givers, and the grandeur of the gift.

MAX OWEN.

Brooklyn Bridge from the New York side.

The Brooklyn Bridge.

In every bird's-eye view of Greater New York the Brooklyn Bridge must always be a prominent object. Its two magnificent towers rising from the water's edge on both shores loom up in the outlook from every eminence in the neighborhood.

Seen from the base, they rise toward the sky with a solid and indestructible splendor, and from the river they lose nothing of their superb height, while the bridge itself, hung from shore to shore with unparalleled boldness, is more fully revealed here than at any other point.

No general view, however, can show the scope of the entire work. The long span may be depicted, for it is high above all the surrounding objects, but one must be on the bridge itself to see what a wonder of engineering it is. It is not merely a suspension bridge across a wide and deep tidal river, but by means of enormous masonry arches it is continued high over the housetops, until at one end it reaches the level of City Hall Park, in the centre of commercial New York, and at the other end the heart of Brooklyn.

It not merely bridged the East River, but it practically made one city of two which hitherto were connected only by tedious ferries, which at the best were always liable to the delays of fog and ice. The bridge opened an ample and direct path by which one can accomplish in five minutes what formerly took thirty minutes, and therein the utility of the work is shown.

It is not simply a footway for pedestrians. It is eighty-five feet wide and is divided into five parallel avenues, two for railway tracks, two for carriages and other vehicles drawn by horses, and one for pedestrians. The latter is much higher than all the others, and gives to foot-passengers an uninterrupted view over the roofs of the cars which run on both sides of it, a view so comprehensive and impressive that the footway is a favorite resort to sightseers.

The entrance to the bridge is a rather small structure, opposite the City Hall, and is dwarfed by the much finer buildings surrounding it. Passing out of the station one walks on a masonry viaduct which becomes higher and higher as the land over which it is built slopes down to the river. Now the observer is on a level with the top-story windows of the houses, now above their chimneys, and now marching directly over the tracks and trains of the elevated railway. With each step taken along the smooth path, the men and women in the streets below grow more like pigmies, and a desert of roofs, with wreaths of steam and smoke issuing from the chimneys, spreads out in all directions.

By and by the end of the viaduct is reached and we enter upon the bridge itself. The massive cables by which it is suspended sweep up in front of us and pass over the top of the New York tower, from which they sweep down again with an exquisite curve to the very middle of the bridge, thence up over the top of the Brooklyn tower and down to the anchorage on that side of the river.

Now we are high above the ships lying at their wharves and we can see them from stem to stern. In a few seconds more we are walking under the archway of the New York tower, and the splendor of the work touches us with increasing awe. The bridge hangs across the river without other support than the cables for a distance of sixteen hundred feet; the floor is one hundred and thirty-five feet above high water, and the tower rises two hundred and seventy-seven feet above the level of the shore, or as high as the dome of the Capitol at Washington.

The real size of the tower cannot be seen, however, for from the sea-level it is built down out of sight under the rushing water to its foundations on the bed-rock seventy-eight feet below the surface, and thus from top to bottom it is actually three hundred and fifty-five feet high.

Advancing to the middle of the span we look down again. Two cities with two million people are below us, and the eye can pick out every notable building. Looking straight down, the great Sound steamers and large ships can be seen passing under our very feet, for we are higher than their topmasts, and it seems as if we had acquired the power of wings and were poised somewhere up in the sky. The harbor is visible down beyond the Statue of Liberty, and the ocean steamers are pouring endless ribbons of smoke toward the Narrows. We can see the fortifications, the low shores of New Jersey, with the purple band of the Orange Mountains in the distance, and the blue, curving hills of Staten Island.

Railway and Driveway, South side.

Constant trains of cars are passing over it, and the carriage-ways on both sides are filled with a stream of trucks, wagons and coaches. At night hundreds of electric lights sparkle along the bridge, and to the mariner coming into harbor through the Narrows, they appear to be some new and brilliant constellation in the sky. Passing under the arches of the Brooklyn tower, over which the vast supporting cables are again carried, we reach the Brooklyn end of the bridge, a little over a mile from the point at which we started.

The work on the bridge was begun in 1870, and day by day passengers by the ferry saw the towers growing in height, until in 1876 both of them were complete, though there was as yet no connecting link between them. How could the first wire be stretched across the water?

Traffic in the river was stopped for an hour, until a scow could carry a wire rope from one tower to the other and back again, so as to form an endless belt running from anchorage to anchorage. A board seat slung by its four corners to this belt and passing over it, was used in the preliminary stages by the workmen for uniting other wires to the original one. By slow degrees wire was spliced to wire and multiplied until, after seven years of work, the splendid suspension bridge was completed.

Each of the four enormous cables which sustain the bridge contains five thousand wires one-eighth of an inch in thickness. They all rest upon the tops of the towers, without dragging upon them, and thence they are carried to anchorages nine hundred and thirty feet inshore from the towers, where they are secured under a weight of about sixty thousand tons of masonry.

Everything about the Brooklyn bridge is substantial, as indeed it ought to be, for the work cost nearly sixteen million dollars. The superstructure is calculated to last for a century at least, and the imagination cannot compass the distance of the future when the towers shall have fallen.

WILLIAM H. RIDEING.

The Grant Monument.

The formal national crowning of the career of General Grant occurred in 1897, when his grand tomb at Riverside Park, New York, was dedicated. The ceremony was as impressive as befitted the occasion, and is not unlikely to be remembered as the culminating incident of the great Civil War period of our national history.

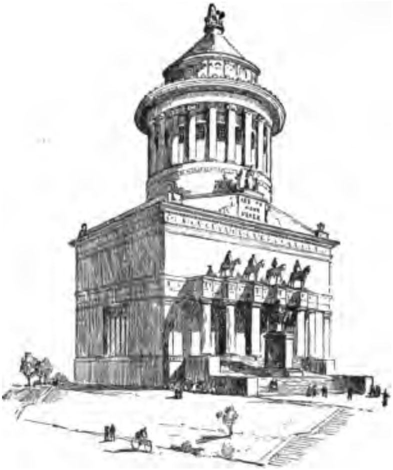
Napoleon Bonaparte's mortal remains, lying in the magnificent marble crypt beneath the golden dome of the Hôtel des Invalides in Paris, have hitherto been more grandly entombed than those of any man of modern times. This distinction is henceforth to be shared by the relics of our patriot warrior whose humanity was signalized by his famous words, "Let us have Peace."

These benign words of the man who, though bred to arms and preëminent in war, never forgot the gentle instincts of a Christian, have perhaps more endeared General Grant to the American people than all his victories. It is eminently appropriate, therefore, that the inscription, "Let us have Peace," should be most conspicuous on the hero's mausoleum as proclaiming for all time to our people, and especially to our military leaders, that the one justification for war arises when no other means can secure an honorable peace.

The history of the Grant Monument is well known. As soon as it was determined that the General's tomb should be in New York, the Monument Association opened its books for popular contributions. Owing to various difficulties, the undertaking made little progress until 1892, when Gen. Horace Porter assumed charge of the work. His prestige as a soldier, his long service on General Grant's staff during the Civil War, and his close friendship with the great leader made him thoroughly acceptable to the nation as the directing mind of the enterprise. Money immediately began to accumulate, Eighty thousand persons contributed sums averaging seven dollars and fifty cents each, or in all about six hundred thousand dollars.

No finer location for such a monument could have been selected. It stands at the northerly end of the high ridge, in the loop of the Riverside driveway, just at the point where two noble views are obtained, northward up the Hudson River past the Palisades, and southward down the harbor.

The monument itself is so original, so unique in design as to startle the beholder at first sight; but after the first impression has passed, the grave and noble simplicity of the architectural conception commends it to the soul. It dignifies the fame of American art, for the designer was our countryman, Mr. John H. Duncan.


General Grant's Tomb.

The structure consists of a huge square erection of smooth white granite, surmounted centrally by a capped dome encircled by columns. All four sides are alike except the south, where there is an entrance portico, with a double row of granite pillars, over which is inscribed, "Let us have Peace."

Even granite is susceptible to erosion by the elements. Consequently the best possible quality of stone was sought. Specimens from the quarries of New York, Michigan, Pennsylvania, Virginia and Rhode Island were tested by the committee and found unsatisfactory. At length a very superior granite was discovered far in the interior of the State of Maine.

This stone is very light in color, so nearly white, indeed, as to resemble marble, and be mistaken for it at a little distance. It is quite without blemish or cleavage sheen, and experts believe it will resist the action of climate for many centuries. The cost for transportation, labor and special machinery for working it was very great.

Internally, the monument is occupied entirely by the memorial hall and central pit, or crypt, at the bottom of which stands the great granite sarcophagus containing the coffin. One looks down upon it from the main floor through a circular opening eighteen feet in diameter, surrounded by a heavy, handsomely wrought rail.

The sarcophagus itself is cut from a single block of stone, and weighs about five tons. It rests upon a low pedestal, or support, of Quincy granite. The crypt is about fifteen feet in depth below the floor of the hall; on either side are recesses for military emblems or busts, as at the tomb of Napoleon.

The Sarcophagus.

The ceiling of the memorial hall consists of four grand arches springing from the four sides of the edifice and of the interior of the dome, the central point of which is a hundred and sixty-five feet above the floor. There are no columns of support here; the entire weight of the dome rests on the four great corner piers of the structure, which contain staircases by which visitors may ascend to the circular gallery about the dome, a hundred feet or more above the floor of the hall.

The interior work is of marble, both Italian and American, but has been kept austerely plain and free of ornamentation. Two of the corner piers were built to contain cases in which to show the swords, medals and other war relics of General Grant.

C. A. Stephens.

Elevated Railroads.

For a great many years the city of New York was hindered from making its natural growth by the lack of means of getting quickly from one part of it to another.

Manhattan Island is long and narrow, and the lower end is wholly given up to business. A ride from two to six miles every morning and evening in a slowly moving street-car takes too much valuable time, and is very uncomfortable, owing to the crowds travelling at the beginning and end of each business day.

There were only three ways to remedy the evil. Horse-power had to be given up, and steam or electricity used with fast trains on a surface railroad, or above or below the surface. The dangers of a surface road would be so great and its interference with business so annoying that it was never seriously considered. The great objection to an underground road was its excessive cost.

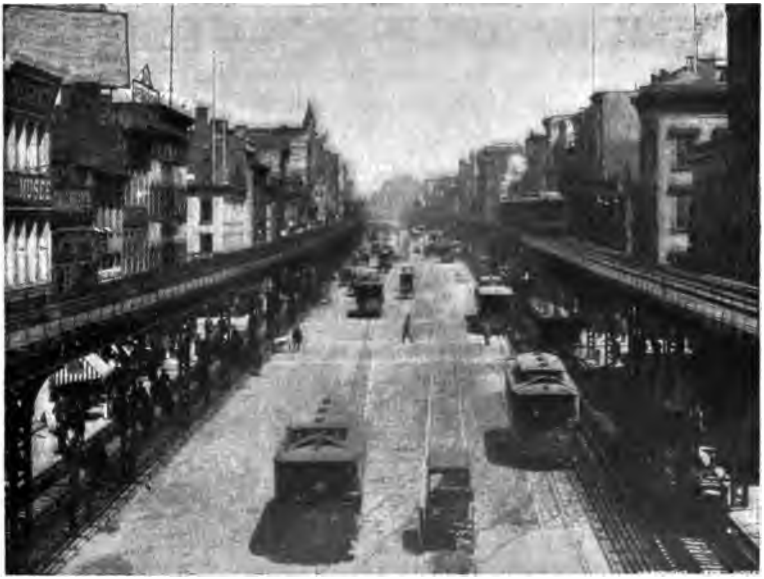
The elevated road was unpopular at first. An experimental section was built, which was afterward extended, so that for two or three years there was in operation a railroad on stilts, running from the Battery, at the lower end of the city, to Central Park, a distance of about five miles.

After years of contest for right of way and popular approval, a system of elevated railways was completed, consisting of four lines. They start from the Battery with one double track road on each side of the city, then each separating, the two eastern lines run to the Harlem River, and of the western roads one ends at Central Park and the other far up at 155th Street.

The increasing popularity of these elevated roads, and the rapid rise in prices of land in the upper part of New York, as block after block of dwellings was erected, naturally influenced real estate men in Brooklyn to build rapid transit roads to the outlying districts of that great city.

The completion of the Brooklyn Bridge removed the risk of delays by the ferries, and insured a quick passage from New York City Hall to the great region of homes across East River, by the lines of elevated road that start near the Brooklyn end of the bridge and connect with other roads that run to all parts of the city and its suburbs.

In some streets the railroad is supported by a single line of pillars standing at the edge of the sidewalk, so that the trains run on each side of the street. In other streets the tracks rest on double rows of pillars connected by iron girders. The pillars rise from the sidewalks in narrow streets, and in some places from the central part of the wide avenues.



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Elevated Road in the Bowery.

The one-legged system, as it is called, looks insecure; but competent engineers say it is perfectly safe, and that there is more danger from straining the works in the direction of the road, when trains are started or stopped, than there is from giving way in the direction across the track.

The stations are reached by long flights of steps, as the road runs along on a level with the second-story windows, or higher. Those who are observant will notice that the rails rest on sleepers placed more closely together than on a surface railroad, that the rails are more solidly spiked down, and that there is a guard inside each rail, along its whole length, to prevent cars or engines from running off the track. The fare is the same for any distance, five cents. The stations are about half a mile apart, or less, and the trains do not stop except at the stations.

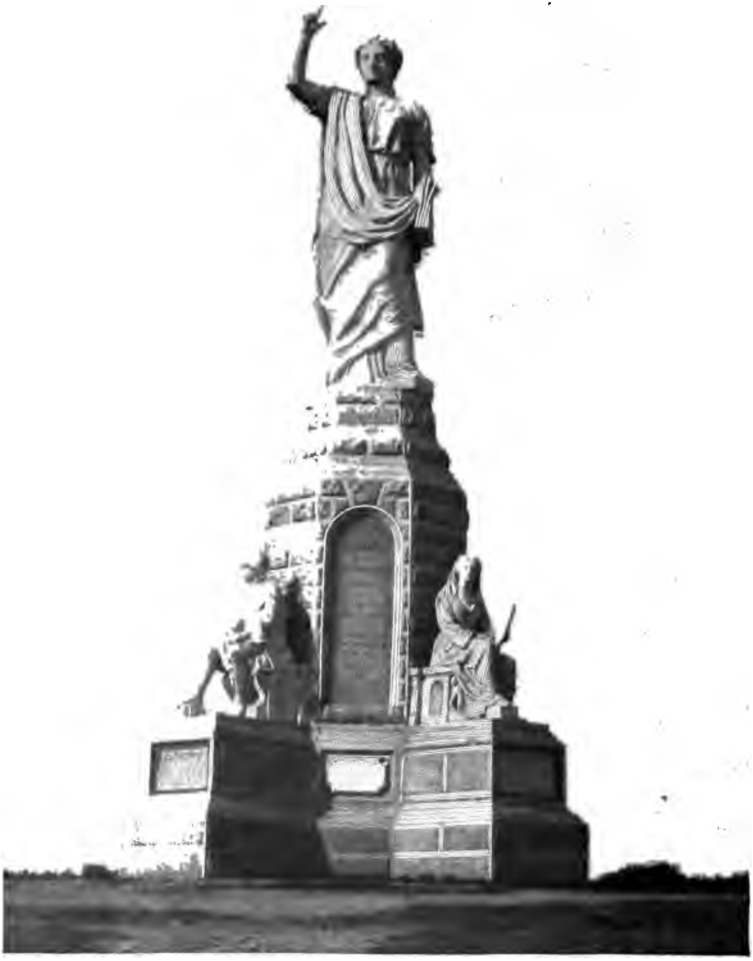
A ride on the elevated railroad is a pleasant trip. It gives a curious sensation at first to be whirled along over the sidewalk, so near to the second-story windows of tenement-houses that you could see what the families living there had on the table for breakfast, if the cars did not go so fast; to look down upon the heavy teams jogging along in the street, or to watch the train as it runs upon a sharp curve.

Those who travel every day soon get accustomed to the strangeness of the trip, and think no more of it than farmers' boys think of a ride in a hay-cart. They run up the long stairway, fling down a nickel and snatch the ticket, which they drop into the box as they rush to the cars. They quietly read their daily paper till they have almost reached their destination, when they push to the doorway, ready to step off as soon as the guard opens the gates.

These roads are a great blessing to New York, because they enable people to live farther away from the centre of the city, and therefore more cheaply, and yet lose but little time in travelling. They add immensely to the opportunities of New York City for growing in business and wealth.

MAX OWEN.

IN NEW ENGLAND.



National Monument to the Forefathers.

Plymouth Rock.

Every summer thousands of people from the country outside New England visit the neighborhood of Boston. While there, they generally show no small amount of interest in historic sites. Many embark on the little steamer that plies daily between Boston and Plymouth, and make thus a pious pilgrimage to the celebrated Rock, which is coming to mean to Americans somewhat the same thing that the famous stone at Mecca means to the Moslems.

It is a pleasant trip by water to Plymouth. The visitor from a distant part of the country generally remains on the forward deck, watching the sandy shores, golden in the morning sun; he gazes interestedly at Minot's Ledge Lighthouse, of which there was a picture in the geography which he studied at school, and muses over the wooded shore of Marshfield, where Daniel Webster lived and died.

But long before Plymouth is reached, the pilgrim's attention is likely to be diverted from the great beauty of the bay and its hilly, monument-crowned shores by his extreme desire to get an early glimpse of the Rock.

All the strangers are simply straining their eyes to see the Rock; and when the landing is made on the long wharf, the procession of people from distant parts takes up a steady and rapid march toward a curious canopied structure in the distance, which has been pointed out to them.

The first thought which all of them have is this: "Why is the rock so far from the water?" It seems to be distinctly inland, and is really at several rods' distance from the present shore. And yet there is no doubt that it was formerly by the water's edge. The building of wharves and the dumping of earth for nearly three hundred years has carried the shore line out into the harbor.

When these modern pilgrims come flocking up, they behold a structure of carved granite, which looks very tall in proportion to its diameter, with a round column at each corner. This structure is The Canopy. It is designed to mark the site of the Rock, and protect it from desecration.

Within this structure an iron fence surrounds the Rock itself. This fence tends to increase the reverential feeling that a visitor has for the Rock, for it seems to set it apart forever as a thing not to be touched. But at each end of the enclosure there is a gate; and these two gates are unlocked for visitors, and actual access to the Rock itself is permitted.

The Canopy.

This permission in its turn adds to the spirit of veneration, for one feels that, as the barrier of iron has been hospitably broken for his benefit, he must not fail to estimate the privilege at its highest valuation.

Then the crowd from the boat begin to file through, past the Rock, or upon it. In looking at them, one is made aware how false is the assumption that Americans are an unemotional people. They often behave in a most extraordinary way here.

Nearly all bend down and press the palms of their hands upon the Rock, and especially upon the figures 1620, which are sunk into its surface, as if the Pilgrims from the *Mayflower* had carved them there. Now and then a woman bends down and kisses the Rock, or makes a child do so. It is no uncommon thing for two people to stand on the stone and embrace each other. Many stand on the Rock long enough to make good resolutions, and imagine that they will keep them the more sacredly for their being made at such a place.

They are not deterred from making these demonstrations by the bearing of the crowd about them. There is no laughter and merrymaking about it; all is done with solemnity.

The hill which overlooks the Rock is indubitably sacred ground, for upon it the *Mayflower* Pilgrims who died during that first terrible winter in the new colony were buried in unmarked graves, that they might not be counted by the Indians.

After visiting the Rock, excursionists scatter through the beautiful old town to admire its dainty white houses of ancient architecture, and its narrow streets deeply shaded with great linden and elm trees; or to visit the old Burial-Ground, the Museum and the Monument.

Visitors arriving in Plymouth by cars will naturally visit these places in reverse order. They will see on the hill, not far from the station, the National Monument to the Forefathers, a marble statue forty-five feet high, standing on a lofty pedestal which bears at the four corners symbolic figures, Freedom, Morality, Education and Law, and historic panels on its sides.

Plymouth from the Harbor.

In Pilgrim Hall one is surprised to find so large a collection of articles brought over in the *Mayflower* and other relics of the earliest Colonial days. On Burial Hill it is interesting to see the earliest marked graves, and the site of the first church of Plymouth, which with cannon mounted on its roof was also the first fort. But after all, the most interesting object is the Rock.

To very few of these excursionists does it ever occur to doubt the authenticity of the Rock, or to ask how it is known that the passengers of the *Mayflower* landed on it. Most people suppose that the Rock is mentioned in the early accounts of the landing; but such is not the case.

There is but one original account of this first landing, and it relates that, after the people of the *Mayflower* had left Clark's Island, "they sounded ye harbour & found it fitt for shipping, and marched into ye land & found diverse corn-fields & little running brooks, a place fitt for situation; at least it is ye best they could find." Nothing whatever is there about landing on a rock; nor does any early account of proceedings at Plymouth even mention a rock.

But in the year 1741, nearly one hundred and twenty-one years after the landing of the Pilgrims, permission was granted by the town of Plymouth to certain persons to build a wharf on the shore; and these persons proceeded then to cover up with their wharf a rock which lay there.

Plymouth Rock.

And then appeared Thomas Faunce, a man ninety-four years old, who lived in the farming country back of Plymouth. He told the wharf-builders that they ought not to cover up this rock. When he was a boy, he said, his father had assured him that the passengers of the *Mayflower* landed upon it.

It does not appear that any other Plymouth people came forward and supported this tradition. At any rate the wharf was built, and though the stone was not covered up, it became the door-step of a warehouse.

When people began to investigate the story of Thomas Faunce's warning, they looked in the records to see if his father had been a passenger on the *Mayflower*, and they found that he had not. But they did find that Thomas Faunce was born in the year 1647, and that in his early life in Plymouth he must have known some of the *Mayflower's* passengers.

Therefore his story was entitled to some credit. Faunce was talking of a thing that was almost within his own recollection, and completely in the recollection of the generation before him.

Moreover, there are no other rocks along the shore in that neighborhood. This one, at the time of the landing, must have stood out, solitary and alone, on a shore which, according to the Pilgrims' relation, "was compassed about to the very sea with oaks, pines, juniper, sassafras and other sweet wood." In the midst of such a wilderness, a rock projecting boldly from the shallow shore would have provided a natural landing-place.

Farther down the bay, in the adjoining town of Kingston, there is at this day such another rock, not carried inland by the filling up of the shallow waters. One has but to approach this Kingston rock in a boat from the bay to see how its brother of Plymouth must have beckoned a welcome to the passengers of the *Mayflower*.

The Plymouth tradition of the Rock therefore seems to have a good basis in reason and probability. At any rate, it has grown steadfastly with time. And now the legend is fixed, and rendered sacred by time and common acceptance. The American who loves his country can hardly look without genuine emotion on this Rock of Plymouth, where the American experiment of local self-government was really begun under the most thrilling circumstances.

J. E. CHAMBERLIN.

Provincetown.

There is no quainter place on the stretch of coast from Cape Cod to Cape Ann, than the curious fishing town of which Thoreau has said, "A man may stand there and put all America behind him." Provincetown is not only a quaint town, pleasant to live in, but it is also an excellent place for shore work in natural history. That is the reason why a small party of people interested in science chose it for a collecting trip.

Provincetown has one main street. Therefore, when the night train comes in, the traveller is not puzzled about the way to turn. He soon reaches his hotel, where he is sure to get a cordial welcome, especially if he comes in the spring when guests are not numerous. At the time of year we went any stranger was a curiosity, and especially scientific strangers.

Crowds of youthful admirers followed our party about from place to place, rather more eager to have a finger in our pie than was convenient or desirable.

Cloudy days are rather more pleasant for work on the shore than on the water, and the first morning we spent in wandering along the uneven, sandy shore, where the wind has made many hills and hollows. There is not much vegetation to bind down the sands, and they continually tend to drift.

The Cape people erect in the most exposed places pyramids and hedges of staves, making them firm with stones so as to prevent the sand moving in an undesired direction. In a good many places a rough beach-grass grows, which forms the anchor of the Cape, since the woods which previously existed there have been buried by the sands.

At some places on the Cape the government erects stone embankments along the edge of the beach to prevent serious changes in the coast-line. The changes in the position of the sand were well shown a few years ago, when its shifting exposed the wreck of a British vessel of the old colonial times, the existence of which had been unsuspected by the present generation. Farther down the Cape, at Orleans, there was uncovered in 1863 the hull of an ancient ship, a quarter of a mile from any water. The hull was supposed to be that of the *Sparrow-hawk*, stranded in 1626.

The windows on the sea-side of the Cape houses show the effects of the blowing sand, which grinds them until they become opaque. Between the hills of sand lying back of the beach are many cranberry bogs, covered in May with beautiful white flowers. Cranberries, next to fish, are the most important product of the Cape.

Main Street.

On the sand could be picked up many of the black, leathery, purse-shaped eggs of the skate, with their two prong-like extensions on each side. The eggs are among the common objects on the shore, and look very pretty when covered with the delicate little sea-animals that grow over them. As we wandered we also found many bits of rockweed covered with the neatly-formed spiral tubes of some annelid worms.

We took a share in clam-digging, and turned up many of the soft or long clams used in every bake. This fellow is easy to get, as he lives just below the surface of the sand, and keeps connection with the water by a long, black tube commonly called the head. His mouth is really at the opposite end from the tube, and the water containing the food has to run round the body of the clam before reaching it.

Another clam, not nearly so easy to capture, because it burrows as fast as a man can dig, is the razor clam, long and narrow, with a black shell. He must be got with one quick thrust of the spade, and may be enticed from his sandy burrow by sprinkling salt on the sand.

Shells are quite plenty along the beach. One of the most common is the whitish Purpura. This snail gets its food by boring through the shells of barnacles and various shell-fish. From cousins of the Purpura the famous ancient dye, Tyrian purple, was obtained. On puncturing the animal a greenish fluid exudes, which changes to purple in the sunshine.

It takes five snails to dye a square inch of cloth, and the ancients obtained the dye by the tedious process of putting the shells into a mortar, crushing them, and mixing the product with water and salt or nitre. So great was the labor of preparing the dye, that in the reign of Augustus one pound of the dyed wool sold for one hundred and seventy-five dollars.

Another snail, Lunatia, found along the shore, drills holes in shell-fish by using the small, flinty teeth on its ribbon-like tongue. It is perfectly indifferent as to the object it attacks, not even sparing its own young.

After the snail has died, and its shell lies abandoned on the beach, the hermit-crab, in order to protect its soft body, often takes possession, and carries the shell around on its back. These little crabs are very active and ready to fight one another, but they are also great cowards, and after a preliminary skirmish each combatant is likely to retreat into his shell, and close its opening with his big claws.

There is often quite an active demand for empty shells, when several crabs, which have grown too large for their rented quarters, have to change their houses. Then if two crabs come to the same empty shell, a fight for its possession often ensues. The house does not serve to protect the little fellow from the hungry fishes, for they swallow Mr. Crab, house and all.

The most interesting things on the Provincetown shore are some whale skeletons, well bleached by the winds and waves. The whale fishery of New England had its beginning at this town, and even though the finback grows less plenty and more shy each year, the chase has not been entirely given up.

The animals were formerly hunted with sailboat and harpoon, but as they became fewer the sailboat got to be too slow, and a few years ago the steamer was substituted. The boat steams up as close as possible to the whale, a bridge is thrown out at the bow, and from the end of this two men make the attack. They fire a bomb-lance from a gun and the bomb explodes in the body of the animal and kills it.

Provincetown.

Sometimes the whale gets away, oftener still he is not present at all. When shot, the animal sinks, and then the whaler has to watch for him to rise again. This happens when decomposition has generated gases in the body. The carcass is then towed ashore and cut up, and the part not used carried out to sea and abandoned.

In former times larger whales must have come into Provincetown harbor and thereabouts than now appear, for in 1755 Doctor Burchsted rode in his horse and chaise into the mouth of one landed on King's Beach. He afterward had two of its bones used for gate-posts at his house in Lynn.

The custom of decorating front yards with whales' jaws continues in Provincetown. They afford a quaint and inexpensive substitute for flowers in a place where all but the hardiest vegetation has a short and troubled life. Finback bones are plenty at the Cape. At the old, abandoned blubber works at Long Point, there is a ship-load of them waiting to be carried away by curiosity-hunters. A little upholstering will convert a big vertebra into a comfortable stool.

Main Street, Provincetown, follows the sand up the hills and down the hollows, having on one side a narrow plank walk, on the other side often separated from the ocean by a stretch of beach. It is not a paved street; but tramping and liberal use of shells has made it tolerably hard, and smooth enough for the slow driving of the town. Quite a number of shops are scattered along the streets. Those which are not connected with the fishing industries are often general in character, and keep everything from crib to coffin in stock.

Many of the yards of the houses contain flakes, which are long, rough frames on which the salt-fish are spread by the older men every sunny morning to dry. Between these are other yards with boats hauled up in them, and fishing-nets spread out to be mended.

Low carts, with the body hung below the axles of the wheels, are drawn by sober horses through the street; and on the sidewalk the town crier, like the famed one of Nantucket, except that he has a bell, walks slowly along, now and then halting to cry a piece of news or notice of some meeting.

Near the railroad and at other points long wharves stretch seaward; for since, on account of the shallow water, shipping could not get to the town, the town has gone to it.

Sea yarns have a flavor on the coast which they lack farther inland, and the conscience of an old sailor is so elastic when a yarn is being spun that he can make his story exciting and wonderful enough to satisfy the most exacting.

WILLIAM W. NOLEN.

Cape Cod Cranberries.

"Three years ago that land was fit for nothing but to hold the world together," said a prosperous Cape Cod owner, surveying his cranberry marsh with pride, "and now it's worth a thousand dollars an acre."

It does seem as if fairy tales had come true, when unsightly bogs can thus be turned into gold, until one remembers that the means employed are the prosaic ones of time, labor and capital. A marsh is selected in the neighborhood of running water, its tangle of bushes is burned, stumps and roots are removed, and the sods cut and turned over to give a uniform bottom of the rich underlying loam, which is afterward covered with sand from two to six inches deep.

Each bog is then encircled by a low dike of earth, inside which is a ditch, and ditches are cut across it at distances governed by the character of the soil and its consequent demand for a greater or less amount of moisture. Then the ground is ready for planting, and so hardy is the cranberry that this operation can be successfully performed in an apparently reckless manner.

A mass of plants is sometimes run through a hay-cutter, which chops them into bits an inch long, and these are sown broadcast and harrowed into the soil like oats, yet, after such heroic treatment, they live and spread undauntedly.

The most approved method of planting, however, is that of marking off the ground into squares of eighteen inches, by drawing across it a sled having several runners. The cuttings are then dropped at the intersection of these lines, and pressed into the earth with a forked stick.

All winter, and until the early spring, the cranberry meadows are flooded with water, not only to guard the plants against frost, but that insect eggs may be killed, and the fertilizing agencies deposited which are brought by the stream.

Simply constructed gates of wood separate each diked enclosure from its neighbor, and by these the water-supply can be exactly regulated. It is often necessary to raise the water in a meadow while the berries are ripening, for the cranberry is only happy when its roots, imbedded in the rich, peaty soil, are kept moist, while the sand above is dry.

In its third year of growth a cranberry marsh is ready to begin paying for itself, and the picking season usually lasts from the middle of September for about six weeks.

This brings about an odd division of the school year in the cranberry districts. Their summer term is lengthened and the spring vacation cut short, to enable the fall term to begin near the first of November. This is really a matter of necessity rather than of choice with the committee, for should the schools open, not a single pupil would appear except the smallest toddlers, whom the mother would gladly send out of the way, that she might devote herself to cranberry-picking.

Picking time is the carnival season of the Cape. The ordinary business of life is suspended. Houses are closed from early morning till night. Cooking is done in the evening or on rainy days, and beds are merely spread up in time for the tired workers to tumble into them. Flocks of pickers of all ages and sizes settle upon the large cranberry marshes like swarms of locusts.

Even grandfather comes eagerly quavering along, prepared to earn a little money to provide for his daily smoke in the chimney-corner. Fathers and mothers of families depend on the season for supplying many of their every-day needs; and many a pretty girl who would scorn going out to work at any other time, gladly undertakes this back-breaking occupation for the sake of the pin-money it brings.

Every picker dons his or her worst and sometimes most picturesque clothes for the occasion. Old hats and cape bonnets that have, perhaps, hung in the shed or garret the year round, are seized upon as exactly the thing. Stocking-legs are drawn over feminine arms as a defensive armor against sun and briers. Each picker is furnished with a measure holding six quarts, and the ground is marked off in rows, usually about four feet wide, by cords stretched from pegs.

Often these spaces are varied, as some of the best pickers prefer to work in a division alone; or a party of three girls, or mother and children, wish to pick together.

A veteran picker is the old lady who appears in the accompanying illustration, and who has allowed her portrait to be used on condition that no lies and nothing scandalous shall be told about her. She is one who has "picked a heap o' berries, one sort or another, got together a good deal o' property, and always paid her minister regular."

Cranberries are not picked like strawberries, daintily and one by one. Experienced workers plunge both hands under the vines, palms upward and fingers curved, and literally scoop up the fruit by handfuls. A rake, which allows the vines to pass through its teeth and retains the berries, is also used, but is far less satisfactory than hand labor.

A Veteran.

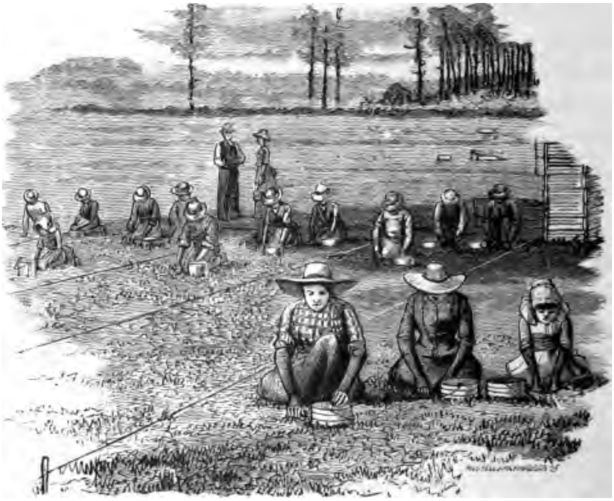
When a measure is filled and emptied, the bookkeeper, standing near, gives the picker credit in his account, though tally is sometimes kept by means of tickets, each of which represents a measure, and may be exchanged at the store for tea, sugar or other commodities.

The usual price paid is ten cents a measure, and the laborers, like those in other occupations, have their streaks of discontent.

A few years ago a strike for higher wages occurred on a large marsh where there were five hundred pickers. Fifty of these, preferring a half-loaf to no bread, kept meekly on with their work at the old price, and, sad to relate, the malcontents, perched comfortably on the dikes as a vantage-ground, pelted them with a shower of sticks and stones. Harmony was finally restored and the strikers went back to work, but, as one old lady among them declared, they looked thereafter upon the fifty righteous as poor-spirited creatures.

"Of course, as they work by the job, there is no chance of cheating," said a visitor to a shrewd proprietor.

"Aint there, though?" he replied, skeptically. "I tell you, cranberry-pickers are just like all the rest of the world. Some wouldn't take a berry to save their lives, and others lay awake nights to think how to fill up their measures.



Picking Cranberries.

"Some will slyly take a new measure and dent in the bottom, and others have got a way of giving the measures a shake so as to toss the berries up and make five quarts look like six. Human nature is mighty human on a cranberry bog!"

Berry-picking has its champion workers, some of whom average over two hundred quarts a day, and there is a well-supported tradition that one nimble-fingered individual once distinguished himself by picking three hundred and fifty quarts in that length of time.

Such workers show the concentration common to all champions. They seldom speak, but bend over the vines, giving their entire attention to the matter in hand. Even at noon, when the pickers sit about on the grass, eating their dinners from baskets and pails, these more zealous members of the band are unwilling to spare the half or three-quarters of an hour allotted to the meal, but seize a hasty bite and run back to work.

There are certain points of honor to be observed on the meadow, one of which relates to that operation known as picking under the lines. A crafty and overreaching worker may see and covet a goodly growth of berries on his neighbor's preserves; but though it be side by side with his own, he may not, under penalty of remonstrance more forcible than pleasant, reach under for a sly handful. One such offence might be punished and forgiven, but a repetition of it would cause him to be ostracized by his fellows, who would ever after refuse to pick in his neighborhood.

The berries are screened, or separated from leaves and foreign substances, by means of a simple, box-shaped arrangement, presided over by women, or, with the more enterprising owners, by a clumsy-looking but most ingenious machine turned by a crank.

The berries, poured in at the top, are winnowed by a blast of air, and as they fall on a glass surface below, the sound ones are separated from those which are imperfect. The good berries rebound, and hop, of their own accord, upon a revolving belt, which carries them out of the machine, while the imperfect ones drop down into a receptacle prepared for them.

The perfect fruit is then placed in barrels of standard size, containing one hundred quarts, or in smaller crates, and sent away to market.

Frost-bitten berries have always been utilized for the making of marmalade, but it is only of late that they have also been used for dyeing. Even one who has not seen the color produced can imagine how royally red it would be.

When cranberries are exported, it would be interesting to know if they are often given a reception similar to that accorded by an English gentleman to a barrel sent him by a friend.

"The berries arrived safely," he wrote in return, "but they soured on the passage." The natural inference is that he had attempted to eat them with cream and sugar.

When we are told that a fair yield of cranberries consists of a hundred barrels to the acre, and realize that a fine quality of fruit always finds a ready market, it is easy to understand a farmer's sinking all his capital in a marsh, or embarking with others in a large venture. Of a stock company recently formed for cranberry culture, a shrewd citizen embodies the opinion of his neighbors in declaring, dryly: "Pretty good stock that; 'twon't hurt it any to water it."

ALICE BROWN.

Newport.

It is a curious fact that the smallest state in the Union bears the longest official title, State of Rhode Island and Providence Plantations, and that the same state is the only one of the forty-five to possess two capitals.

In bustling, progressive Providence, conveniently located for the gatherings of the legislators, all the laws are made for the little state, and the executive offices are there. In the antique and also most modern city of Newport, at the lower end of the long island of Rhodes, the government of the state is annually installed.

The dignified old State-house is well worthy of the honor of the new governor's inauguration. Standing in puritanic plainness, it has witnessed the coming and going of governors since 1741, and its history gives a venerating touch to the impressive ceremonies of Inauguration day.

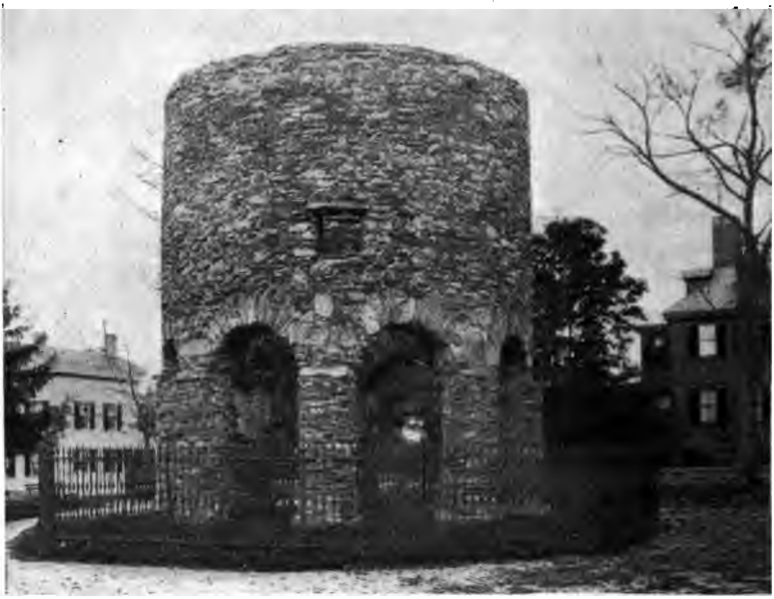
There are several colonial mansions in Newport that, like the State-house, suggest the sober grandeur of the eighteenth century. From these old homes went forth men who gained distinction in letters and in deeds.

In the prim little Touro Park stands a plain granite shaft to the memory of a native of Newport, who in his young manhood won the brilliant victory on Lake Erie that placed the name of Oliver Perry high on the list of American naval heroes.

Another monument of unknown antiquity commands attention in that same Touro Park. It is the Old Stone Mill, the subject of unsatisfactory discussion for many years. Some claim that it is a relic of the eleventh century, erected by the wandering Norseman who attempted a settlement on the Island of Peace.

Yet such a strange structure would, it seems, have attracted the attention of the English settlers, and been named in early records and letters; but the earliest mention is in the will of Governor Arnold, who died in 1678, and bequeathed his "Stone-built Windmill."

It is a circular tower, made of rather small, unhewn stones, supported by round arches on stone pillars. On moonlight nights in summer, when the band plays in the park, this unique old structure fascinates the beholder, and suggests to the imagination dreams of the past that fancy weaves into poetic visions indescribable. But it is modern Newport that attracts the American princes and the European ambassadors, the Newport of the last half century, the city of summer-time, of luxury and beauty.



The Old Stone Mill.

The architect and the engineer have built the palatial villas and constructed the magnificent avenues; the landscape-gardener has beautified the lawns and planted the flowers: but Nature long ago placed there the soft and balmy air, soothing to tired nerves, never harsh with chill or wearying with heat; the most romantic of cliff scenery, with its Paradise and Purgatory, its Spouting Rock and Bathing Beach, its endless view over the ocean's boundless horizon and its charming picture of bay and islands, and the miles of pathway in which no hint of the ocean's proximity is possible.

The tourist, on his first visit to Newport, is always disappointed. He expects to see the magnificent hotels of Saratoga; he finds one modest inn, located so far from the beach that in it there is no suggestion of a watering-place.

He expects to find the beach crowded at the bathing hour; he finds there is no bathing hour, and only a few people are on the beach, except on excursion days. He expects to find innumerable cottages nestling side by side, as at Cottage City; he sees big buildings of varied schools of architecture, some without symmetry or style, buried in the surrounding trees and scattered along the great avenues.

He hopes to see showy crowds of women and men on beach or cliff or park; he sees a few quiet people on street or lawn, till the time for the afternoon drive on the avenue. There, or on the Long Drive to Fort Adams, on band days, he is simply bewildered by the magnificence of the turnouts and the display in the carriages.

If he is so fortunate as to receive an invitation to one of the spreading villas, he finds within the most elaborate furnishings and decorations that perfect taste and unlimited means command. He meets the most graceful ladies and polished gentlemen, and in their presence he realizes the meaning of Newport's high repute. It is the inner life of modern Newport that holds the potent charm over every one who gains an entrance to its society.

MAX OWEN.

A Great Arboretum.

American tree-planting has passed through several stages, each of which has had its practical and its poetic side. When our ancestors came to the eastern coast of North America, they found many more trees than they had use for. They cleared away the forests by axe and fire that they might have the use of the ground; and their inherited fondness for trees, dulled for the time being by the fact that the woods were in their way and sheltered all sorts of enemies, did not lead them to spare many of the forest trees about their dwellings.

They planted a certain number of fruit-trees, which in almost every instance came from the seed of some bit of fruit carefully brought from the old home. The cherishing of these seedlings from the mother country was an interesting and romantic thing; but the trees that grew from them were generally of poor quality.

But when the great forests had ceased to be so terrible, the ineradicable tree-love in the hearts of the descendants of tree-worshipping Gauls and Britons began to assert itself. They planted a few English shade-trees in their dooryards and on the streets; but as a rule, the European trees, adapted to a climate radically unlike ours, languished and died, or made but sorry specimens in maturity.

Then, after our ancestors had been more than a hundred years established upon the continent, they began to feel a love for the native vegetation. In the North they planted many elms and maples, which have grown to great proportions. In the South the live-oak was planted, or was cherished where it had survived or had sprung up. At the same time the useful qualities of our native trees began to be recognized, and people began to cultivate and transplant them. Finally, acquaintance with the vegetation of foreign countries in climate like our own, and the introduction of foreign plants of beauty or value which will thrive in our soil, have given variety to the shade-trees and shrubbery that now thrive in our parks and lawns.

It is in its relation to the question of the fitness of trees and shrubs for cultivation that the Arnold Arboretum, in Boston, is most useful. This institution, which may be called a living, growing manual of trees and shrubs of the North Temperate Zone, was established chiefly through the bounty of James Arnold, of New Bedford, who, in 1872, bequeathed to Harvard College one hundred thousand dollars to establish an Arboretum, or scientific tree-garden.

Arboretum Driveway.

The bequest enabled the university to add to the Bussey Institution, a school of agriculture with which it had already been endowed, at Jamaica Plain, within the limits of Boston, such an amount of land that the Arboretum now comprises about one hundred and sixty-four acres.

The Arboretum is far from being a mere nursery, where trees and shrubs are found growing in rows. There is within its grounds, indeed, a nursery, where labelled plants and trees of every species are cultivated, and where the student may always find, in a little space, every woody plant which will grow out-of-doors in the latitude of southern New England; but this nursery occupies but a corner of the Arboretum.

The object of the place is to cultivate these trees and plants under such conditions that they will all assume their characteristic and perfect form, both when they stand alone and when they grow in clumps or thickets. This involves a vastly greater amount of room than nursery cultivation would require.

The Nursery.

The surface of the Arboretum is so varied as to provide every sort of tree with the kind of soil and situation that it prefers. The lay of the land has been regarded in selecting the ground for the different families of trees, subject to their arrangement according to botanical sequence. Here and there noble trees, already standing, have been spared, though they may be out of their proper relation.

Inasmuch as certain large trees thrive best when they have an undergrowth of bushes, they have been accommodated with the thickets which they like best. The thickets give chance for introducing almost everywhere the native flowering shrubs in which the eastern half of North America is so rich. The excellent roads and paths which run through the Arboretum have been lined with these beautiful shrubs, which make the roads appear as if they ran through the margin of a particularly luxuriant forest.

In walking through the tract where the oaks grow, one naturally begins with the big native white oaks of Massachusetts, which are found here in the largest size, because they happened to be standing here when the Arboretum was started. The white oak does not need an introduction to observant people who live in the United States east of the one-hundredth meridian; but Boston folks have to be introduced to a very familiar friend in the central West, the bur-oak, whose acorns are exceedingly good to eat. They are as sweet in the Arboretum as they are in the marly openings of southern Wisconsin; but the trees have not yet reached that mature and broadly and gnarly spreading stage which makes the bur-oak one of the most eminently climbable trees in the world.

It is a favorite tree wherever it grows, and the people bestow upon it, in certain sections, such pleasant names as the overcup and mossycup oak, on account of the curious burry cup in which its edible acorns grow.

Here one finds European and Asiatic oaks; and the mention of these last brings us by a short cut to a very interesting feature of the Arboretum, the propagating-ground, where the director is cultivating the young trees whose seeds he has brought from Japan.

The northeastern part of Asia has a climate which so much resembles that of eastern North America that its plants and shrubs are usually more hardy here than are those of Europe. To introduce them all to the Arnold Arboretum, and thence to general cultivation as many of them as are beautiful and interesting, the professor made a journey to northern Japan. There he obtained the seeds of a great many trees and shrubs which are scarcely or not at all known in America.

These seeds he brought to the Arboretum and planted them in boxes. The plants are put out as soon as they are large enough and the weather is warm enough. In open frames on the grounds we may see hundreds of little Japanese oaks, birches, hornbeams, maples, alders and magnolias growing, for the professor found in the northern island of Japan a large magnolia which may grow on the frozen hills of New England or the wind-swept plains of the Northwest as thriftily as maples or cottonwoods.

Here is a garden where foreign trees of a little larger size are growing in rows with cabbages and lettuce. They seem entirely at home in this humble company, and benefit by the cultivation which these familiar vegetables get.

They have still another stage of growth to complete before they can be planted out in their proper place in the Arboretum; and this last stage of growth in the propagating-grounds, where the young trees from all parts of the world stand in rows, is decidedly interesting.

In the Garden.

Every one of these young trees when it goes into its permanent place, has its location definitely marked upon a map of the Arboretum. It has its number, and its history is recorded, the time and manner of its planting, the origin of its seed, and every fact that a botanist, a woodcraftsman or a student would ever want to know.

When the Arboretum is fully planted, it will be not only a complete collection of all the trees and shrubs which will grow in the climate of northeastern America, but a systematized record of the characteristics and capabilities, the strength and the weakness, of each plant for every sort of cultivation.

Add to this the museum of woods and the great tree library on the grounds, which is, no doubt, the best in the world, and we have an idea what a great arboretum may be. It was certainly a noble thought to endow and put into operation such an institution. It looks toward a future of such gardening, park-making and foresting as will not only express the instinctive love of Americans for trees, but realize the magnificent capabilities of our soil and climate.

J. E. CHAMBERLIN.

A Boston Market.

When the first of the sleepy milkmen are going their rounds, and the luxurious man lies fathoms deep in one of his half-dozen morning naps, then the markets which feed great cities are teaming with bustle and interest. If the citizen of Boston who finds a comfortable breakfast on his table is curious to trace its source beyond the kitchen, he may rise at cockcrow, in places where crowing is a daily fashion, and visit the old historic Faneuil Hall Market owned by his city.

He will hardly be among the earliest comers, however, for the wagons of the market-gardeners, laden with fruit and vegetables, often start at nightfall, and sometimes at four o'clock in the afternoon, that they may be at the market betimes next morning.

Many of these men drive in from towns immediately adjoining the city; but some of them come from places thirty-five miles away, seeking short cuts that they may be first at the ferries, and first in reaching their destination and securing standing-ground there.

Arrived at the market, whether at midnight or in the morning darkness, the men arrange their wagons in short, orderly rows beside the great building, so that plenty of space is left in which to drive and walk between the groups. Then the horses are unharnessed and stabled, and the carefully covered wagons left in charge of the night watchmen, who also guard the boxes and barrels left outside the building, while the sleepy drivers find some comfortable corner to drowse in until the moment of action.

With the first peep of light they are back at their posts, and begin to uncover their loads, chatting together, exchanging jokes, and talking over the probable market prices for the day.

Presently appear the picturesque figures of women, with rough, uncovered hair, tattered dresses and faded shawls, each bearing a capacious basket on one arm. They wander about, hoping to pick up a discarded vegetable here and there, and waiting for the barrels of refuse to be brought out from the stalls within.

When these barrels are deposited on the sidewalk an eager search begins, and the baskets are speedily enriched with cauliflowers which show the first brown specks of decay, bunches of celery containing one or two perfect stalks, and sweet potatoes partially spongy from age or misfortune.

Faneuil Hall Market.

"Ah! it's many a fine bit ye can pick up here to put in the soup pot!" calls one woman, glancing at an observer with a knowing look which is almost a wink; and another thrifty gleaner adds, as she seizes upon a wrinkled turnip, " Five courses I'll have, the day, and if Jimmie buys a bit of liver there'll be six ! "

With every increasing ray of light, come wagons from the provision stores and smaller markets of the city, to select from the waiting carts large quantities of the vegetables and fruit needed for their daily sales. The scene becomes animated ; the broad street is alive with voices. On Friday, especially, the day when suburban stores send in for their Saturday's stock of provisions, it is difficult to find one's way about among the carts, without jostling eager bargainers.

Perhaps the most interesting season to visit the market is during the summer or early fall, when thousands of berry boxes or great loads of peaches arrive daily. A few firms sell their fruit by auction, and this naturally adds a lively excitement to the scene. Groups of Italian owners of fruit-stands are on the spot betimes. One marketman says of them, " An Italian starts a stand on nothing, but in a month he comes down here and buys whole loads of fruit for cash."

It is in the fall that the market wagons are most delightful to the artistic eye. Pale green cabbages, yellow squashes, piles of celery in varied green, and golden carrots seem actually to light the air.

Meanwhile, as this fruit and vegetable traffic is going on at one side of the market, the meat has arrived on the other, and is rapidly carried into stall and cellar. Great white-covered carts, like emigrant wagons, stand there, packed to the very top with pink and white carcasses; and men adorned by burlap mantles fastened with a skewer are busily tossing them into their destined places.

At sunrise a gong strikes, and the market proper, the great building lined with stalls flanking a central walk, is opened to trade. Then the bustle within is scarcely exceeded by that without. Men hurry about, drawing on their white frocks and overalls, and begin to remove great carcasses of meat from the sacking which has protected them from dust through the night,

Selling from the Carts.

or hang on huge iron hooks the meat which has just been brought in from the storehouses.

One man is assorting his stock of eggs by testing their freshness. A lighted candle is placed in the side of his egg box, and over this he holds each egg for a second, and looks through it, before passing it on into its appropriate place. The degree of clearness shown through the shell indicates, to his practised eye, the probable age of the egg and its state of freshness.

Quite early in the morning come the stewards of the great hotels, to buy their supplies for the day, and then sets in the regular trade, from that of the young housekeeper who wants a steak, but privately wishes she knew tenderloin from porter-house, to that of the boarding-house keeper, who buys in large quantities, expertly selected.

Meantime, while food of all sorts is magically appearing in such profusion, comes a smaller dealer, whose stock is fresh and sweet as the early morning. This is the watercress woman, a slight little creature who comes in tugging a big basket filled with bunches of cress, dark green in its freshness, and dripping with moisture. This she sells by the dozen bunches at the different stalls.

There is something fascinating in the idea of her trade, so connected is it with damp fields and clear, running water.

Then, bringing an odor sweeter than that from "Araby the blest" to those who remember grandmother's garden, comes a young girl with a basket full of the mints, catnip for the kitty, and sage and sweet marjoram.

Outside the market are new phases of interest everywhere. A clear, triumphant sound breaks upon the air. It is the crow of chanticleer, and looking about, after recovering from the first surprise of hearing a barn-yard echo in a city street, one notices several rough coops containing live fowls. Some of these are putting their red-combed heads through the slats, and gazing about in a very inquiring manner, and one is preening her feathers as if to be in gala costume for the sacrifice.

These fowls are bought by the Orthodox Jews, whose religion forbids them to eat meat killed by any but their own sect, and it is no uncommon sight to see a woman walking away from the market, carrying under her arm a lively and very surprised biddy, whose legs have been securely tied together.

But where do the fish-stalls of the market obtain their daily supplies? To find an answer to that question one must walk to the wharf. There boats are coming in laden with the fish, which is bought on the spot by wholesale dealers, and not only supplied to various local markets, but also packed and sent away to other towns and cities.

The wharf itself, rather slimy with fish-drippings, is made lively by men running about with large hand-carts, filled with the fish which they have just obtained from the boats.

The previous process of loading the carts is a rapid and picturesque one. Large baskets of cod or mackerel are filled on board the little boats, swung up and over the side by means of a rope, and dumped into the cart. The man who fills the basket is hardy and sailor-like, clad in a short jacket or a colored jersey, and the motion with which he spears several fish at a time on a small fork is suggestive of the hay-field.

Other boats have come in bringing clams, and these are shovelled into small baskets, dipped in water to be rinsed, and then handed, dripping, to the wharf.

Returning to the market proper, we shall find it full of bustle and interest all day long. The marketmen outside, as soon as their stock is sold, drive homeward, sometimes quite early, but often, on days when trade is slow, not until late in the day.

The market itself closes at five o'clock, except on Saturday night, when it is open until nine. A gong strikes fifteen minutes before the closing hour to warn the keepers of stalls to do their daily cleaning up, and when it strikes again its warning note embodies the old nursery rhyme:

Home again, home again, market is done.

ALICE BROWN.

A Maple-Sugar Camp.

Along in March the people in Vermont, and in other states where the sugar-maple is grown, begin to look for what they call the sugar-snow. While the ground is still white and the river is filled with broken ice, just as the winter is ending and the earth is relaxing from its frosty thraldom, the soft snow that comes helps the flow of sap, and hence it is called the sugar-snow, and is welcomed with much gladness and many preparations. Sugar-snow and sugar-time are among the most delightful experiences in the year to young people in the Green Mountains.

After the outbreak of the Civil War, my father moved from a large town into Vermont, and I shall never forget the excitement which prevailed among us when he announced one day that work would then begin in the sugar-place.

There were four of us, or, counting Tray, the dog, five; and I don't see why Tray should not be counted, for he took as much interest in the proceedings as any of us and long afterward the words "Sugar-place!" would always rouse him from the deepest slumbers. Only one other word ever had the same effect upon him, and that was "Woodchucks!"

The first work in a sugar-camp is to scatter the buckets. The farmer goes to each tree with his bit, and bores one, two or three holes through the bark. Into each hole he inserts a wooden or galvanized-iron spout, through which the sap flows into the buckets suspended below it. Thirty years ago the buckets and spouts were all of wood, but they have been superseded by tin and galvanized iron, which are cleaner and more economical.

The work of tapping is not easy, as the snow is usually very deep when it is done. A large sugar-place in Vermont, where a great amount of maple-sugar is made, contains from one thousand to three thousand trees, and a place with less than three hundred trees is called a small one. If the weather is favorable, that is, when the days are warm and the nights frosty, the buckets attached to the trees first tapped are filled before the last ones have been bored, and their contents must be boiled at once. The flow is sometimes so copious that the men have to work night and day to prevent loss.

Gathering Sap.

The sap is gathered by a man or boy who goes to the buckets and empties them into large pails suspended from a sap-yoke which he wears on his shoulders.

When there is a good crust over the snow to hold him up, this work in the bright morning, with the bluest of skies above, is not unpleasant, but when the orchard is large, and the snow deep and soft, and he has been toiling through the day and into the darkening night, attending to the steady drip, drip, drip in the overflowing buckets, he is apt to think that sugar-time is not so jolly after all.

Perhaps, too, he does not feel well from having tasted the sap too often. It is so delicious as it comes fresh from the tree that it is a wonder if he does not drink too much of it. Sometimes the boy is relieved by having a team of horses and a sled, on which a tub is placed to receive the contents of the buckets.

While the sap is being gathered the boiling must be kept up continuously. In the days of wooden spouts and buckets the sugar was made in a great iron caldron, suspended by chains over a fire in the open air. As the fire burned and the caldron bubbled, the winds made free contributions of dirt, twigs, sand and smoke, which did not tend to improve the flavor of the sugar. Probably most of the sugar made in Vermont would hardly be marketable to-day if it were made in this way.

Now sugar-houses are built, containing brick or stone arches, with sheet-iron pans, or evaporators, in which the sugar is boiled. Being kept from contact with anything which is not strictly clean, it is purer and of finer grain and lighter color than it used to be. When the sap has been boiled until the water has nearly all passed out of it in the steam, it is strained and then rapidly boiled until it grains or hardens or changes from syrup to sugar.

A Maple Sugar House.

The work of sugaring off in the old caldron made a red-letter day for the children. Provided with a spoon and saucer, or a wooden paddle made especially for warm sugar, each boy and girl would set out over snow-drifts much higher than their heads, and when the sugar was nearly done and would lie on snow, the fun began in good earnest.

Filling their saucers with the sugar, they repaired to the nearest clean snow and spread the sugar over it to cool before they ate it. There was more merriment than at any candy-pulling, and it sometimes happened that all of the farmer's family were encamped in the woods to help in the work.

On one occasion old Tray learned a lesson he never forgot. Always ready to take any sugar offered him, he evidently considered that he had not been treated often enough, and took matters in his own — paws.

I had just dropped a lot of the hot sugar on the snow, and while waiting for it to cool had turned my back. The temptation was too much for dog-nature, and like the Jackdaw of Rheims, "While no one was looking, Tray stepped up and twigged it."

When his teeth shut firmly down on the hardened wax, as the sugar was called, he could not open his mouth again. He scraped with his paws, ran round and round, and rolled over and over, but no relief came; and worst of all, his most intimate and loved companions stood laughing at his misfortune. He could only sit up and wait for his lockjaw to melt. Never after that would he eat the before coveted wax, and he always showed that he took it as an insult to have it offered to him.

When I went to the old schoolhouse of our district, I was proud to find in my geography that Vermont produced more maple-sugar than any other state in the Union.

Some few farmers, instead of making the sugar, make delicious maple-honey, and, sealing it up in bottles, send it to the great hotels in the cities. One way or another a farmer with a large sugar-place in Vermont makes a good deal of money from it every year.

Ruth Russ.

A New Hampshire Fish-Farm.

Fish-farming, or the breeding of fish by artificial means, is a comparatively new industry, and as the reader probably knows, its object is the stocking of rivers with salmon and trout. Early attention was given to it in New Hampshire, and there was opened a free passage from the ocean to the very heart of the Franconia Mountains through the Merrimac and the Pemigewasset Rivers.

Fishways have been constructed in these rivers to enable the fish to ascend. A fishway is a spout or aqueduct designed to overcome the steep ascent from the head of a dam to the bed of a river which would baffle the fish in its progress, and it is so divided by partitions that the pilgrim from the ocean can make his upward journey and rest from time to time in favoring eddies instead of being exhausted in a struggle with the abrupt fall. There is an excellent reason for helping him on his way as much as possible.

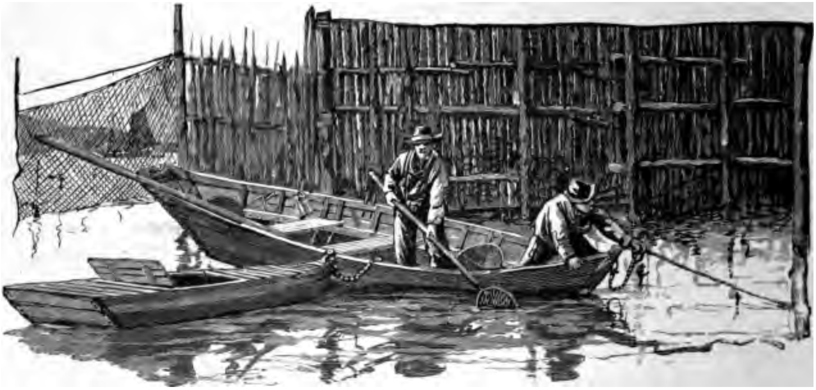
Young Salmon.

Salmon begin to ascend the streams about the first of June, and they make a holiday of the summer, sporting in the eddies and shady nooks, and playing in the rapids. Late in the autumn when they are paired, each couple selects some spot in the coarse sand or gravelly bottom, and in a hole therein the female deposits her eggs. The male hovers about the spot and helps her in covering the eggs with sand and gravel to a depth of six to ten inches.

This operation being complete, the happy couple return to their winter quarters in the ocean, leaving their progeny to hatch, wriggle and wash out of the nursery as best they may.

In the natural process very large numbers of eggs are destroyed by various causes, and probably not more than fifteen per cent. of them come to life; but by the artificial process, the New Hampshire Fish Commission has for a series of years obtained from ninety to ninety-five per cent.

In connection with the hatchery is a trout-pond for the preservation of breeders, and a pond for the reception of salmon taken while on their way to the mountains. A kind of trap called a weir is made of poles, brush and netting, from which the salmon are scooped out with hand-nets, and carried in boats made for the purpose, to the breeding ponds.


In a Salmon Weir.

Late in autumn, the fish that have been captured during the summer season and held prisoners in the reception pond are closely watched to ascertain when they are ready to spawn. As soon as detected in the natural process of preparing a bed in which to deposit eggs, they are carefully taken by means of a net, and when their eggs have been secured, they are turned loose in the river to make their way back to salt water.

The hatching-house is a comparatively inexpensive building; it is long, low-studded and double-walled, the space between the two walls being packed with sawdust to prevent the water inside from freezing.

The water is brought in a large iron pipe from a spring, and distributed to each of the six hatching-troughs by faucets, which regulate the supply. The troughs are ten inches wide by six deep, extending nearly the entire length of the building; and they are arranged on trestles to allow the water to flow with a gentle current from the upper end to the lower, and thence off into a waste-pipe.

In each trough is a series of hatching-boxes, which may be described as square, shallow sieves, made by fastening small wire screens for a bottom, to a frame a foot long, and wide enough to just fill the trough crosswise. A free current of water flows through the sieves over, under and among the eggs, which are deposited and spread upon the wire screens.

The eggs are spherical in shape, nearly the size of a common pea, of a delicate pink color, and transparent enough to show the eyes of the embryo salmon. About three months' time is required for hatching them.

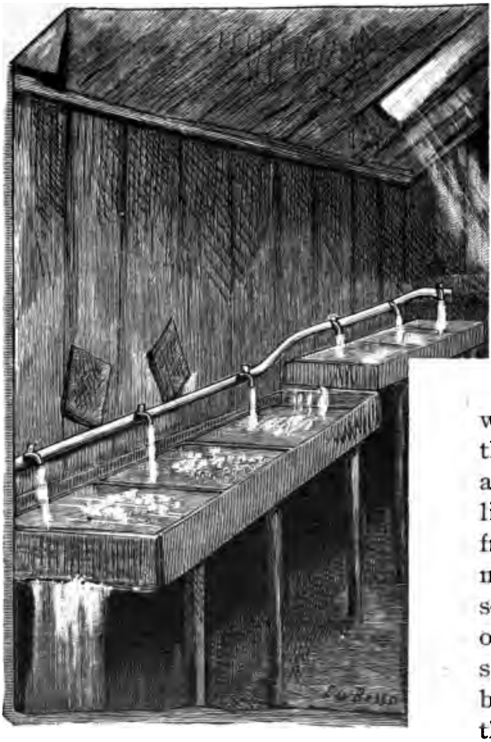
Of all frail forms of life, the young salmon, just hatched, exceeds in interest anything the writer remembers having seen. A casual observer would notice the cast-off shells, and would think he also saw as many eggs as before. What appear to be eggs are, in fact, yolk sacks, or in other words, provision bags, with the outer shell cast off, each sack with its little salmon attached just below and behind where the gills are to be.

Looking sharp we detect two little black specks with a hair line extending from between them, for half an inch or so. These little black specks and the hair line are the eyes and the backbone of a salmon, which in the course of eight years, perhaps, if nothing befalls, will weigh twenty-five pounds, and measure three feet in length.

This extremely slight trace of creation is enveloped in a body of liquid so transparent and perfectly clear that in the space of a few days a complete set of ribs can be seen starting out from the backbone and gradually gathering into the form of a fish. In the course of a week something like a head and tail appear and the thing begins to wriggle.

It has not yet got strength to move its yolk sack, which remains exactly where it was when hatched. By and by the transparent liquid, which encloses the lively little framework, begins to have a cloudy look along the backbone, and by a tremendous wriggle, the embryo succeeds in starting its yolk sack just a hair's breadth. Then it takes a rest, and wriggles again, making another advance.

During the second week it develops rapidly, the sack growing smaller and the fish larger. The liquid has hidden the framework from sight now, and is gradually solidifying. At the end of three weeks the yolk sack is all absorbed in the body, and it is time for the perfect little creature to get its nourishment from the surrounding element, the water. The young salmon are now considered capable of caring for themselves, and are turned loose in the river, or conveyed to such other streams as it is thought desirable to stock.



The Hatching-Troughs.

M. HAWKS.

Among the Pines.

Maine has been very properly called the Pine Tree State, for it is in her almost exhaustless pine forests that she finds one of her sources of wealth and commercial importance. Although spruce and hemlock have been gradually taking the place of the pine in the lumber trade, yet there are still vast, unexplored tracts stretching far away toward Canada, where this noble tree still flourishes in all its old-time grandeur and luxuriance. Early in the fall, sometimes by the first or middle of October, the advance guards of the lumber crews, each consisting of some half a dozen men, start for the forests where their employers' claims are situated.

They select a place as near as possible to one of the small streams that thread this vast lumber region in every direction, and build the camp that is to serve them and their comrades for a shelter during the long, cold winter that is at hand.

A hut, proportioned to the size of the crew that is to occupy it, is built of large logs, carefully notched and fitted at the corners, and chinked with moss and clay. A stone fireplace is built in one corner, and bunks for the men are placed against the wall and filled with the fragrant tips of pine boughs to serve as beds.

The roof is made of long, split shingles, fastened down with long poles instead of being nailed, and finally covered with spruce boughs, which, after the first fall of snow, keep out the wind and frosts very effectually. The earlier camps used to have only the hard-trodden earth for floors, and their inmates got along without such conveniences as tables, plates, etc., but now they are provided not only with plank floors, but a table with a suitable supply of crockery is in most cases provided, as part of the woodman's necessary outfit.

Near the hut of the loggers another is constructed with much care, to make it as comfortable as possible for the dumb companions of their winter's toil, the patient, plodding oxen or the quicker horses. By the time everything is ready for their reception the tote teams make their appearance with the cattle and the supply of food that is to serve them all during the winter. Flour, pork, beans, molasses and tea are the staples.

Sometimes a barrel of corned beef finds its way into the camp, but as a rule the diet of the men consists of hot flour bread, with pork fat for a relish, and tea without milk, sweetened with molasses.

These, with the indispensable dish of baked beans, cooked to perfection in a bean-hole dug in the earth and lined with hot stones, form luxurious fare to appetites sharpened by hard work in the cold, frosty air of midwinter.

Sometimes a lucky shot may bring down a moose, or an equally lucky find may put them in possession of enough bear-meat to make every day a feast-day for a week or two. The fat of the bear is said to be very delicate and sweet to the taste, and is much prized by hunters and lumbermen. In it they fry their favorite dainty, the Yankee doughnuts.

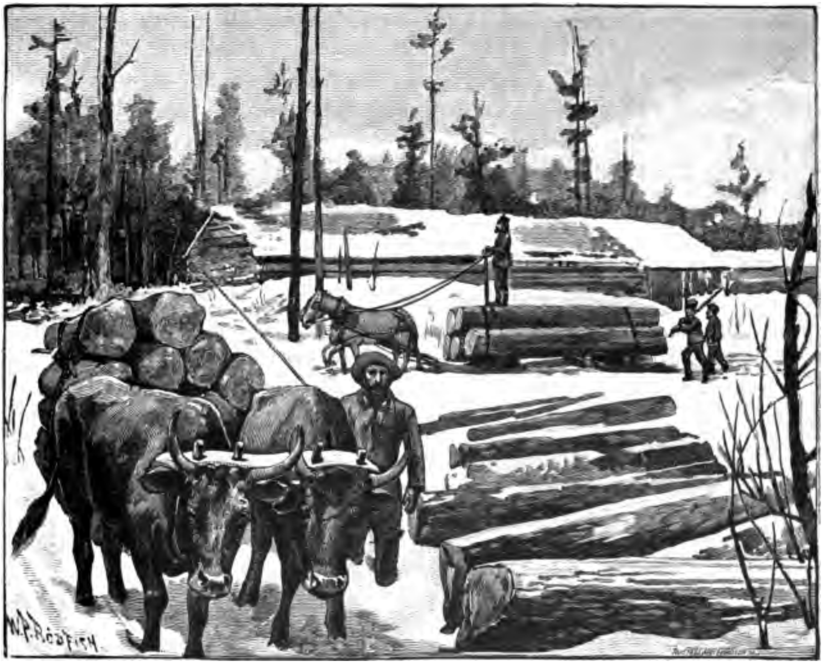
A crew generally consists of a boss, who takes the charge of affairs, allots the work and sees that it is faithfully performed by the choppers, swampers, teamster and cook.

The boss decides upon the best place to commence operations, and then all hands clear a road from that spot to the stream, so that when the snow comes there will be a comparatively smooth and level roadway for the teams to drag their ponderous loads over during the winter.

Commencing his work with the earliest gleams of daylight, the sturdy, strong-armed chopper plies his axe, stopping only for a hasty dinner at twelve, until the ghostly shadows of twilight fall upon him from between the dusky tree-trunks, and the evening star, far above in the blue, wintry sky, seems resting like a glowing gem upon the topmost spire of the giant pine above his head.

Then the weary worker turns his steps campward, where a blazing fire and a hot supper soon make him forget the cold and fatigue of the day; while in the companionship of his mates he finds the mental stimulus that binds him to the half-forgotten world outside his own forest solitudes.

Besides the hard work, there is always more or less danger in felling these mighty trees. The experienced chopper can easily detect by the motion of the swaying trunk in what direction it is about to fall, and he makes his retreat accordingly; but as the enormous branches go crashing down through the tops of the smaller trees, they are often broken and hurled through the air, crushing whatever lies in their track, occasionally wounding and sometimes killing the



A Camp in Winter.

luckless chopper, whose skill in woodcraft proved insufficient to shield him from this unexpected danger.

The tallest trees are usually sawed at the landing into logs of a convenient length for the drive, which begins as soon as the spring sun has acquired power to melt the immense masses of snow and ice that cover the hillsides. Then every little brook is swelled to a raging torrent, into whose eager embrace the logs are hurried, and the perilous and exciting work of the river-driver begins.

From lakes and tributary streams the logs are driven into the main river, where they form one indistinguishable mass called the main drive. The different crews now vie with each other in deeds of agility and daring, and it is wonderful to note the skill and promptness with which these men, scorning danger and discomfort, manage to keep those millions of rolling logs in the main channel of the river.

Without a dry thread of clothing for many days and nights in succession, the river-driver knows neither rest by day nor ease by night.

Sometimes the boat containing the supplies fails to reach the stopping-place for the night in advance of the crew, and then the poor fellows, cold and wet as they are, must lie down hungry and shelterless upon the bare ground, to snatch such rest as they may find in their comfortless quarters.

With the soles of his boots armed with sharp spikes to keep him from slipping on the wet, smooth logs, and a setting-pole, with which to guide them and steady his own steps, the river-driver considers himself fairly equipped for the toils and dangers awaiting him.

In a narrow channel between high banks, or at the head of a fall, the logs are apt to form what is called a jam, that is, one or more logs chance to strike across the stream in such a way as to obstruct the passage, so that those pressing on behind, unable to pass, are piled high one above another in the most inextricable confusion.

To break one of these jams is a difficult and almost always dangerous task, as the operator must in many cases cut away with his axe one or more of the obstructing logs, thus letting the whole mighty mass loose in an instant, and giving him little time to escape from the terrible onslaught.

Sometimes when the banks are high and the channel very narrow, it is necessary to let a man down from the top by a rope to perform the dangerous task; and if he escapes with only a few bruises and scratches he may consider himself very fortunate, since the parting of the rope, or the failure of his comrades to draw him up at the very instant that the jam starts, might be death swift and sure, without any possibility of rescue.

When at length the logs reach their destination they are enclosed in a boom. This is simply a floating fence of large logs, fastened together so strongly that their wild brethren, fresh from the forests, cannot escape from their restraining arms.

And now it is the duty of the boom-master to see that each owner has his own logs assigned to him fairly and justly. Every man's logs are marked by some kind of hieroglyphic cut deep into each log by the axe of the loader.

If any log, either by carelessness or accident, has reached the boom unmarked, it becomes the property of the boom-master, who is also entitled to a certain proportion of the lumber, as his share for the care and labor of harborage and distribution of the whole.

It seems a tame ending to all this wild turmoil, this dumb exhibition of unloosened savagery, to see the poor logs at last floating meekly down to the sawmills, where

> Steam, the slave, shall tear them with his teeth of steel,

carve them into plain, commonplace boards and staves, that shall, in time, lose even the fragrant breath that alone reminds one of their forest origin, and hidden beneath a coat of paint and varnish, make comfortable or beautify the homes of civilization.

MRS. H. G. ROWE.

A Winter Harvest.

The traveller who, on a pleasant midsummer day, ascends the Kennebec River in Maine for the first time, is likely to be much interested in the signs, which appear as soon as his boat has passed from salt water into fresh, of a great industry which evidently surpasses all others in importance thereabout.

At frequent intervals upon the Kennebec are seen great wooden structures. Some of these have wide-spreading gambrel or curb roofs, and are picturesque objects in the landscape; others are simply vast barracks of rough planks and boards, unpleasant and disfiguring to the shores of the broad river. All of these are ice-houses, and they are the depositaries of the great ice-harvest of the Kennebec.

In midsummer, scarcely less than in the latter half of winter, these great houses are a scene of activity. Schooners are brought to their very doors by tugs, and there are seen lading with great blocks of clear, blackish-green ice. From each of the ice-houses a long and slightly inclined plane leads down to the light wooden wharf where the vessel lies; and down this smooth incline a continuous line of blocks of ice, urged on by men and boys with picks, is descending.

The Kennebec River is a great centre of the ice-cutting business because, joined with a snug winter climate which makes ice a tolerably sure crop, it has a great stretch of navigable fresh water. Clear ice may be cut here over the very spot where ocean vessels may moor the next summer and load it, to be taken directly to the cities on the coast farther south.

Perhaps the business of harvesting ice on a great Maine river comes nearer to the fabled plucking of apples of gold from the trees in the garden of the Hesperides than anything else in modern practical industry. The ice, to begin with, is Nature's gift to everybody. There is no property in it, no ownership of it by any one, until it has been marked out to cut; and any one may do that, and possess the ice, if he is able to cut it afterward.

But this free gift of Nature brings to the inhabitants of the Kennebec River, along the twenty-five miles from Augusta, where there is a dam, down below the foot of Swan Island, where the water begins to be brackish, a yearly income of from one to four millions of dollars, according to the price for which they sell their crop of a million to a million and a half tons of ice.

Loading the Ice-Schooner.

To the Kennebecker, therefore, the winter is the real harvest-time. That is the season when fortunes are most readily acquired by the enterprising, and employment most easily found by those who need it.

An ice-claim must be marked out anew each year, and preëmpted over again as often as the ice melts away. On the Kennebec, as soon as the ice is strong enough to bear a man, the claim is staked out by setting bushes or stakes in the ice, or often, where it is very systematically done, by setting in joists with boards nailed across them.

The construction of an ice-house on the bank carries with it, in practice, the right to cut the ice on the river in front of it; and as the ice could not be secured without an ice-house in which to store it, only those who are able to get a foothold on the land can gather the ice-harvest, theoretically free to all.

There is nothing to do, after the claim is marked out, until the ice has become thick enough to carry a horse, so that the snow may be scraped off as fast as it falls. Ice will not make rapidly under snow, and will not attain its full thickness. The iceman's most anxious time is when there is danger of a snowfall on the ice before it is strong enough to bear horses to scrape it.

If the snow steals a march on the scrapers in this way, it is often necessary to get rid of it by a very laborious and expensive process. A hole is cut through the ice, and the snow saturated with water. When this freezes the ice will bear a horse; but the worthless snow-ice thus formed must be planed off, also by horse-power, with a planer made for the purpose. The scraping and planing is called cultivating the ice, and it is generally a very expensive sort of cultivation. A single night may cause the icemen an expense of five or six thousand dollars in the cost of the removal of a heavy snowfall.

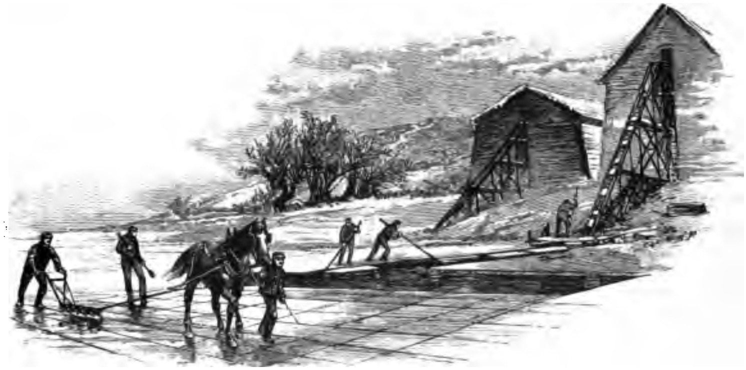
The iceman's crop is nearly ripe when clear ice has formed to a thickness of twelve inches, and then the preparations are made for the harvest.

From the point on the shore where the elevator leading to the ice-house reaches the brink, a canal from five to twenty feet wide, according to the magnitude of the business, is opened out into the river, through which the blocks of ice are presently to be floated to the house.

It must be kept clear as long as the ice-harvest continues, no matter how many degrees below zero the mercury may fall. In the day, the constant moving of ice-blocks through the water suffices to keep the channel open. At night, in freezing weather, the necessity gives rise to one of the coldest and most lonesome occupations that one can imagine.

Armed with a great triangle of heavy pieces of wood, which he drags through the water, a man marches up and down the channel all night long, crushing and scattering the thin sheets of ice with his triangle as fast as they form. The workman to whom this cheerless task falls must be heartily glad that the gray wolves no longer make the frozen Kennebec a thoroughfare.

With the opening of the canal comes an interesting result at once. The thickness of the ice is increased by the exposure of the water and the cooling of its surface. The cold is let into the river, as it were, both below and above the cut. By the time all this has been done, the middle of January has generally been reached. The date varies, of course, with the season.



The Harvest in Progress.

The ice has now a thickness of from twelve to eighteen inches. Sometimes it is even thicker than that; but a thickness of more than eighteen inches is a disadvantage, because it renders the blocks of ice hard to bar off from the field. Now the field is carefully marked off, with a grooving machine drawn by a horse, into regular parallelograms, which are generally twenty-two by thirty inches square, the size which the individual blocks of ice are to have.

The ice-field, unlike other fields, is cultivated before it is plowed. It is only now, when the marker has grooved the ice across and across, that the ice-plow is brought, or rather that several ice-plows are brought, for several go over the same ground in succession.

A plow which cuts to a depth of six inches first follows the marker's grooves. Then comes another, which cuts two inches deeper, and then another, cutting still deeper, and so on until the trenches have been carried so deep that the blocks of ice may be barred off or loosened from the field.

Beginning at the outermost end of the canal, and working out at right angles with it as far as the field has been marked, the workmen break off, with a heavy wedge-shaped instrument called a bursting bar, sheets or sections of blocks of ice, making a new channel running off from the original canal.

Through this channel the sheets of ice are forced, by means of hooks, to the main canal, and thence to the foot of the elevator which runs to the ice-house.

At this point a narrow bridge of planks is thrown across the canal, upon which is posted a man armed with an iron bar. Standing with his face toward the shore, this man separates the sheets of ice into single blocks, with quick blows of his bar, as they float beneath him.

With a quick push this man thrusts each block over revolving chains upon the elevator. These chains are provided with lags or straight bars of wood, and the block is drawn up the inclined plane into the ice-house by the continual movement of the elevator.

There is here an ingenious but very simple arrangement by means of which the blocks of ice are left at the proper place. At the level of the floor of the ice-house is a pocket or open space in the floor of the elevator, through which the ice passes. When it is desired to carry the cakes higher, the pocket or hole is closed with boards, and the ice intelligently keeps on to the next pocket above.

In the house, the blocks of ice are placed close together on their sides, and left three or four inches apart at the ends, so that they will not freeze together with the melting and freezing to come.

The crop is harvested now; and if the iceman has had a fairly fortunate season, he has garnered at least a thousand tons to the acre. Not unfrequently the crop reaches thirteen hundred tons to the acre.

The river is at its busiest in February, but the opening of navigation brings another busy season. All summer long schooners and barges, under tow, ply up and down, lading at the ice-wharves. The blocks of ice are sent down the runway to the vessel's side, and there lowered into her hold.

Machinery is used here, too, as far as possible. A lowering winch is placed at the hatchway of the vessel, and the ice is lowered by the aid of ropes and pulleys. The workers in the ice-harvest are frequently farmers and their sons from the country lying back from the river. Often the ice-workers are engaged in the sawmills in the summer season.

A man who is industriously disposed may manage to work pretty hard the year round on the Kennebec. So may a horse, for that matter, for the same animal that pulls the scraper and the ice-plow pulls the land-plow, the harrow and the mowing-machine later on. But continuous industry seems to be congenial, both to men and to animals, in the stimulating climate of Maine.

Thus a crop which costs nothing for seed, nothing for the ground to raise it upon and nothing to fertilize, but a good deal to cultivate and still more to harvest, becomes a source of wealth to many, and of profitable employment to many more.

J. E. CHAMBERLIN.

Moose-Calling.

The moose is a noble beast, and any form of honest hunting for him through the deep solitudes of the north woods is full of keen interest and enjoyment. But moose-calling stands alone in the hunter's mind, the most exciting, the most disappointing, the most dangerous method of hunting in New England.

Other forms of hunting moose are more attractive in many ways, but I doubt if the hunter's nerves ever again thrill with quite the same sensations that swept over him that first night when he stood by a little opening in the forest, with the solitude and utter loneliness of the wilderness about him, and heard the deep silence suddenly broken by an angry roar, and then the crashing advance of the great ugly brute rushing straight down upon him out of the dark woods.

Tracking through the first snows requires strength and patience and cunning; and one has, beside the excitement of the hunt, the beauty of the winter woods, and the peace and restfulness of the night-camp. Tracking is warmer and much more comfortable every way than waiting perfectly motionless, without daring even to swing the fingers or stamp the toes, out of which the autumn frost is slowly chilling the life; but it lacks the tremendous impressiveness of the night, and the swift, fierce thrill of the bull's answer and his savage rush.

The same may be said of still-hunting, or creeping, as the Indians call it. In tracking or still-hunting one is following a timid animal that, unless wounded or headed, dashes off in a swinging trot at the first sniff of danger.

When moose begin to mate in September, an old bull grows savage and uncertain of temper; it is never safe, day or night, to approach him carelessly. The call may only alarm him, and send him off into deeper solitudes; but it is just as likely to throw him into a rage that brings him crashing down to attack at sight the first living thing that opposes him.

And so there is always the added charm of uncertainty and danger about it. As for torching and crusting and murdering the poor animals in their yards, where deep snows have imprisoned them, after taking their portraits with a kodak, as so-called sportsmen do nowadays, they are abominable, all of them. No decent hunter, unless driven by hunger, will have part or parcel with those who use them.

The call of the cow moose, which the hunter always uses first, is a low, sudden bellow, quite impossible to describe accurately. It breaks out of the woods and is gone so suddenly as to leave one simply surprised, with no accurate impressions. Before hearing it I had frequently asked Indians and hunters what it was like; the answers were rather unsatisfactory. Like a tree falling, like a cow, like the swell of a cataract or the rapids at night, like a rifle-shot, or a man shouting — these were some of the answers, till one supposed it must sound something like a menagerie at feeding-time.

One night, as I sat with my friend before our bark tent eating our belated supper in tired silence, while the rush of the salmon pool near and the soughing of the wind among the spruce tops were making our eyelids heavy as we ate, a sound suddenly filled the forest and was gone. Strangely enough, we pronounced the word "Moose!" together, though neither of us had ever heard the sound before.

Like a gun in a fog might, perhaps, head the list of similes, though after hearing the sound several times, I am still at a loss to describe it. No two animals ever bellow precisely alike, and the thick trees break up the vibrations, making the sound still more vague, which accounts, perhaps, for the variety of description. A single low, indefinite bellow is heard early in the mating season. Later it is more prolonged and definite, and often repeated twice in quick succession.

The best hunter I ever met used a short and abrupt call, uttered with the accent at the end, and a quick roll of his head as he uttered it. After a second's interval he repeated it, slightly prolonged, with a slower roll of the head. Two seconds after, with the trumpet's mouth close to the ground, he began a plaintive, pleading bellow long drawn out, while the trumpet-mouth described three wide circles in the air, ending abruptly without accent. If no answer came, a half-hour passed before the call was repeated.

Though his call was often successful, I confess it never sounded to me much like that of a moose. Perhaps had I been farther away, with a vivid imagination and in ignorance of the hunter's wiles, I, too, might have been deceived. The answer of the bull varies but little, and is easy to imitate. It is a short, hoarse, grunting roar, frightfully ugly when close at hand, leaving no doubt as to the mood he is in.

Moose-Calling.

Sometimes, when a bull is shy, and the hunter thinks him to be near and listening, he follows the call of the cow by the short roar of the bull, at the same time snapping the sticks under his feet and thrashing the bushes with his trumpet. Then, if the bull answers, look out. Jealous and ready to fight, the beast hurls himself out of his concealment, and rushes in like a tempest to meet his rival.

Once aroused in this way he heeds no danger; and the eye must be clear and the muscles steady to stop him surely ere he reaches the thicket where the hunter is concealed. Moonlight is poor stuff to shoot by at best, and an enraged bull moose is a very big and a very ugly customer. It is a poor thicket, therefore, that does not have at least one tree with conveniently low branches.

The trumpet with which the calling is done is simply a piece of birch-bark, rolled into the shape of a cone, with the smooth side within. It is fifteen or sixteen inches long, about four inches in diameter at the larger and one inch at the smaller end. The right hand is folded round the small end for a mouthpiece; into this the caller grunts and roars and bellows, at the same time swinging the trumpet's mouth in sweeping curves to imitate the peculiar roll of the cow's call.

If the bull is near and suspicious, the sound is deadened by holding the mouth of the trumpet close to the ground; this, to me, imitates the real sound more closely than any other attempt. So many conditions must be met for successful calling, and so warily does a bull approach, that unless far back from civilization the chances are strongly against the hunter's ever seeing his game. The old bulls are shy from much hunting; the younger ones fear the wrath of an older rival.

The calling season begins early in September and lasts six or seven weeks. In this season a perfectly still night is the first requisite. The bull, when he hears the call, will approach silently within an hundred yards. It is simply wonderful how noiselessly the great brute can move through the thick woods.

Then he makes a wide circuit till he has gone completely round the spot where he heard the call, and if there is the slightest breeze he scents the danger and is off on the instant.

On a still night his big, trumpet-shaped ears are marvellously acute, and only absolute silence on the hunter's part can insure success. Another condition quite as essential is moonlight. The moose often calls just before dusk and before sunrise, but the bull is more wary at such times and can seldom be called into the open.

By far the best place for calling, if one is in a moose country, is from a canoe on some quiet lake or river, between two open shores if possible. On whichever side the bull answers, the canoe can then be backed silently into the shadow of the opposite bank.

If there is no water near the hunting-ground, then a thicket in the midst of an opening in the forest is the only suitable spot from which to call. Such spots are rare except about the barrens, which are open, treeless plains scattered here and there throughout the great northern wilderness. Here the hunter collects a thick, dry nest at sundown, and spreads the warm blanket that he has carried on his back all the weary way from camp; without it the cold would be unendurable after three or four hours of silent waiting.

When a bull answers a call from such a spot he will generally circle the barren just within the edge of surrounding forest, and unless enraged by jealousy will rarely venture into the open. He is a creature of the thick woods; never at ease unless within quick reach of their protection.

An exciting incident happened to Alek, my Indian guide, one autumn while hunting on one of these barrens with a sportsman whom he was guiding. He was calling one night from a thicket near the middle of a narrow barren. No answer came, though for an hour or more he felt quite sure that a bull was near and listening. He was about to try the roar of the bull, when the creature suddenly burst out of the woods behind the two men, in exactly the opposite quarter from that which they were watching, and in which they believed their game to be hidden.

Alek started to creep across the thicket, but on the instant a second challenge rang out fiercely in front of them, and directly across the open they saw the underbrush sway violently, as the bull they had long suspected broke out in a towering rage, grunting and grinding his teeth, and thrashing the bushes with his big antlers.

He was slow in advancing, however, and Alek crept rapidly to the other side of the thicket, where, a moment later, his excited hiss called his companion. From the opposite fringe of forest the second bull had hurled himself out, and was plunging with savage roars straight toward them.

A Bull Moose and Herd.

Crouching low among the firs, they awaited his headlong rush, not without many a startled glance backward, and a very uncomfortable sense of being trapped and frightened, as Alek confessed to me in confidence. He had left his gun in camp; his employer had insisted upon it in his eagerness to kill the moose himself.

The bull had come rapidly within rifle-shot. In a minute more he would be in the thicket, and already the rifle-sight was trying to cover a vital spot, when right behind them, at the thicket's edge it seemed, a frightful roar and a furious pounding of hoofs brought them to their feet with a bound.

A second later the rifle was lying among the bushes, and a frightened hunter was scratching and smashing in a desperate hurry up among the branches of a low spruce, as if only the tip-top were half high enough. Alek was nowhere to be seen, unless one had the eyes of an owl to find him down among the roots of a big windfall.

But the first moose smashed straight through the thicket without looking up or down, and out on the barren a tremendous struggle began. There was a few minutes' confused uproar, of savage grunts, grinding teeth, pounding hoofs and clashing antlers, with a hoarse undertone of labored breathing. Then the excitement of the fight was too strong to be resisted, and a dark form wriggled out from among the roots, to look at the struggling brutes not thirty feet away.

Three times Alek hissed for the white man employer to come down, but that gentleman was safe astride the highest branch that would bear his weight, with no desire evidently for a better view of the fight.

Then Alek found the rifle among the bushes, and waiting till the bulls backed away for one of their furious charges, he brought the larger one to his knees with a bullet through the shoulders. The second stood startled an instant, with raised head and muscles quivering, then dashed away across the barren and into the forest.

Such encounters are often numbered among the tragedies of the great wilderness. In tramping through the forest one sometimes finds two sets of huge antlers locked firmly together, and scattered about among the underbrush white bones picked clean by wildcats and prowling foxes. It needs no written record to tell their story.

WILLIAM J. LONG.

Fox-Hunting in New England.

The health-giving, all-day hunt of a fox on his native hills, as free and nearly as fleet as the wind, is a sport which is still popular in some parts of New England, and one which is in a high degree calculated to develop the endurance, wariness and patience which go to make a true sportsman. Though not every day's hunt is successful in the securing of Reynard's brush, there is rarely a day when one cannot be started, and keen is the satisfaction when he falls to the tireless trailing of the hounds, and the patience, good judgment and accurate aim of the hunter.

Each sportsman has one or two hounds which he keeps for an occasional hunt, and from one to five or six hounds are ordinarily used. They are strong, well-made dogs of great courage and endurance, ready and willing to follow a started fox from twelve to thirty-six hours, unless in his flight he sooner comes within reach of the ambushed gun. They are also keen of scent and intelligent enough to understand the many methods used by the fox to baffle them in their pursuit, and to throw them off the trail.

In order that the dogs may work well together they should be acquainted and run close instead of stringing out. They should work steadily in full cry, and slowly, as a fox, if too hard pressed by fast following dogs, will go straight away across country instead of circling within range of the hunter.

While foxes are quite numerous, they are seldom seen unless ahead of the hounds. It is their habit to seek retirement during the day in remote swamps and deep woods where they are not likely to be disturbed, and to emerge after nightfall to roam over the hills. Their lightness and strength of limb takes them many miles in a night.

In hunting them the hounds find a track made by a fox in his nocturnal ramble, and following it carefully in all its windings, come to where the fox has stopped for the day. He is soon on his feet, and leading the dogs on what may be a long journey. If not followed too fast he will usually run in a large circle, and within a few hours swing around to the region from which he was started. The shrewd and experienced hunter, knowing the runways usually taken from a certain starting-point, conceals himself within range of one of them, and waits his chance for a shot.

If the fox comes his way, and if the hunter does not miss him, he is borne home in triumph and exultation over the capture of the wariest, cunningest animal that ever led a hound. If the sly creature takes another course the sportsman shoulders his gun and starts for home, philosophically hoping for better luck next time.

As Fleet as the Wind.

Let me tell you about a hunt I had recently. One day in December we had our first snow, a light, feathery fall lasting during the day till sunset. It was of the right thickness to ensure perfect following the next morning, for snow following is the best, since it is easier for the dogs to keep to the track, and the fox can be distinguished at a much greater distance upon the whitened hills.

In the evening I met Sweet and Robbins, two veterans in fox-hunting, and a hunt was planned for the next day. Later in the evening Robbins and I, with our two hounds, Buck and Sport, met at Sweet's house, where we were to pass the night in order to be in readiness for an early start and a long day.

The next morning, after fortifying ourselves against cold and fatigue by a solid breakfast, and after feeding the dogs, who were in a state of great excitement and crying to be off, we set out for Tatnic Hill, about a mile away, at about sunrise on as beautiful a winter morning as ever dawned; and though it was cold, our brisk walking kept us from feeling it unpleasantly.

On reaching the hill we loosed the hounds, and they bounded away in different directions, well knowing that if they separated they would sooner find a track. We walked around aimlessly in order to keep warm, until suddenly from south of us came floating up Buck's clear voice, singing the news that a track was found. In a very few moments Sport and Flirt had joined him. We could hear their voices growing fainter and fainter in the distance, and we knew that they were heading south away from us.

After a little we could hear them again, showing that they had changed their course, and were bearing east. We stood listening intently, till Sweet said: "Lou, that fox lies in the Scarborough swamp. He'll go north through the woods to Prince Hill, and then to Long Rock, and when he gets there, I shall be there!"

Off he started at a great pace. We laughed, and followed him. Sure enough, the hounds swung around to the Scarborough swamp, and soon after entering it their steady cry broke into a scream as the fox slipped out ahead of them and headed east instead of north.

Straight away east went the fox, till once more the dogs were out of hearing, and we tramped north through the snow to Barrett's Ledges, which we thought he would pass on his return from the river. On reaching them we sat down and rested, and waited further developments. We did not know, of course, whether the fox would come that way, or would take some other route and destroy our chances for the day, for it was now the middle of the afternoon.

We had been sitting there nearly an hour, listening with eager ears, when far in the distance I thought I could faintly hear the voices of the hounds. There was a breathless pause, and then it came clearer and so unmistakable that I exclaimed, " They're coming, boys, run for places ! "

Waiting for a Shot.

At the word we scattered. Sweet went to the brow of the hill, Robbins concealed himself in a clump of white birches near an old barway, and I stood behind some trees near a path that ran out from the woods.

As I stood looking through a small field-glass which I carried, and while the hounds were yet far in the distance, I saw the fox come from the valley below us about a quarter of a mile away, and springing upon a large rock, stop and listen for the dogs with his head turned and one foot uplifted. Satisfied that they were still hot on his track, he dropped from the rock and started on again, running as if he were getting tired, as his next move showed him to be.

In a number of years' hunting I have known foxes to do many clever things to throw off the dogs, such as running into the midst of a flock of sheep, and staying there to let the sheep trample out the sight and scent of their tracks, running in a shallow brook for a long distance, running in a travelled road, and other schemes that only a fox would think of. But the cleverest thing I ever saw done was done by that fox.

After leaving the rock he went to an old stone wall, mounted it and proceeded some distance on the top. Then stepping down he trotted straight out across a meadow for a distance of about twenty rods. He next turned around, retraced his steps to the wall, carefully stepping in the track he had made going out, remounted the wall, crouched for a spring, and bounded through the air like a ball, jumping in the opposite direction at least twenty feet, and coming again toward us.

At the Wall.

Nearer and nearer came the hounds, clearer and clearer came the music of their voices, Buck's bell-like notes, Flirt's high treble and Sport's deep bass making the hills ring again, till finally they burst into sight in the valley, running beautifully, giving tongue constantly, and after following hard all day, still running so close that you could lay a blanket over the three. On they came to the wall, and to the place where Reynard trotted out across the meadow. This track they followed, as he knew they would, till they came to the place where it stopped as completely and suddenly as though the fox had developed wings and flown away.

Then they stopped and seemed to be in consultation, for it was confusing to reach the end of a fresh fox-track in the middle of an open meadow.

But cunning as Reynard was, and well laid as was his plan, the intelligence and experience of his relentless pursuers were a match for him. After a few moments lost in vainly looking for a continuation of the track, the hounds separated. Buck and Flirt went one way and Sport the other, in large circles, knowing that one or the other must pick up the track again. Soon Sport's roar announced that he had recovered the trail, and in a moment they were in full cry again.

It was not long before I saw the fox bound into sight again at the edge of the woods, and after standing a moment switching his tail in evident annoyance, he started down the path directly to me. On he came, while my heart beat so that I could hear it, and I scarcely breathed. "A few more rods," I thought, "and I'll try him."

Suddenly he stopped, raised his head suspiciously and turned abruptly to the left, and ran lightly and swiftly to within eight rods of where Robbins lay. I watched him eagerly, and was wondering whether Robbins could have changed his position, when a wreath of smoke curled out of the white birches and floated lazily upward, and the fox sprang into the air and fell back motionless.

We hastened to him, and the hounds, their ardor increased by hearing the report of the gun, soon came up in great excitement and threw themselves upon the fox; but life was extinct, and they soon left him, and lay down to rest. We were then quite a distance from the village, and when we reached it we were all tired and hungry; but we had that fox's skin, had had a grand day's hunt, and one to be always pleasantly remembered and talked over.

LOUIS B. CLEVELAND.

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